THE
ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

EDITORIAL, ADVERTISING AND PUBLISHING OFFICE:
Dorset House, Stamford Street, London, S.E.1
Telegraphic Address: "Ageekay, Sedist, London." Code, A B C.
Telephone No.: Waterloo 3333 (50 lines).
Subscription Rates, Postage free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

Index to Advertisers p. lxxx. Classified Advertisements—Supp. 23.

Vol. CXXIV. No. 3211 JUNE 9, 1939 Price SIXPENCE

Electricity Supply Questions

I.M.E.A. President's Views

WIDE as is the range of engineering and administrative matters comprising electricity supply, it is posible, nevertheless, to discover a principle theme running through it. This theme, which recurred over and over again in the presidential address to the I.M.E.A. delegates, on Tuesday, is the principle to which all pay at least lip service nowadays—that the interests of the consumer must prevail.

How far do present methods really ensure this? Taking the aspect of consumption per head of population, Great Britain still occupies a low place in the international list but, as Mr. Lamb points out, with regard to the proportion taken from the public mains it comes behind only three countries of Europe which possess large water power schemes. This seems to indicate a greater confidence here in public supply undertakings.

His comparison between London and New York, both depending upon steam generation, shows that the kWh used per consumer is very similar. On the other hand, the proportion of the inhabitants who are consumers is considerably more in New York in every class of use. As this cannot be ascribed to very low charges, absence of other forms of power or correspondingly low gas consumption, there is clearly something for investigation here.

Grid Economies

In dealing with improvements that have been made in recent years, Mr. Lamb pays tribute to the effect of the grid. He holds that its cost has been justified in view of the benefits it has brought to undertakings supplied at grid tariffs, but that it has not realised the expectations of most of the owners of selected stations. Had the latter, then, when the 1926 Act was passed, real expectations of gaining an early direct advantage?

Nevertheless, it is largely due to the economies brought about by the use of these stations that grid-tariff undertakings are expected to be able to increase their outputs sufficiently to furnish the Central Electricity Board with a surplus. In the share-out the claims of selected station owners should be awarded priority—not on grounds of sentiment on account of their previous "altruism," but because, generally speaking, they serve areas in which industries tend to congregate of a type which will be electrified only if very low prices can be quoted.

While indirect advantages to their own consumers may arise out of interconnection, particularly due to technical developments in base-load stations, the owners of selected stations may be regarded as doing the same kind of meritorious work as are those urban undertakings which extend their systems into rural districts—seldom with any hope of immediate profit.

After all, the provision of adequate electrical service means taking the rough with the smooth, and to make electricity more widely available is as important as to sell it cheaply. This is very largely what power companies have to do, as the President recognises, and we are quite in accord with his appraisal of the value of the dual system of municipal and company working. To a large extent the faults of the one have been kept in check by the virtues of the other, while mutual emulation has undoubtedly stimulated progress.

Public and Private Ownership

While municipalities were usually more prompt to appreciate the value of encouraging domestic uses of electricity, the companies were, as a rule, earlier in catering for the larger industrial loads. On the whole also private enterprise has been more ready to take risks and to spend money on new technical developments, so that savings in operation have offset their higher charges on capital. As an example, the three thermally most efficient power stations in this country to-day are company owned and each embodies a different advance on standard practice.

Whether Mr. Lamb is justified in anticipating that the whole electricity supply industry will ultimately be publicly owned will—or ought to—depend upon the results likely to accrue to the consumer Strictly relevant to this question is the reluctance of public bodies to recognise that management and staffs should be adequately remunerated in order to secure the best available. Recent attempts by municipalities to secure "cheap" men furnish only too good a ground for concern.

While the introduction of a Distribution Bill in the near future seems most unlikely, the President be-

lieves that the downward trend of prices will continue. The controversy aroused has, at any rate, had this good result. Municipalities primarily concerned with public advantage have found that this is best secured through the adoption of commercial methods, while companies have learned that they serve the best interests of their shareholders when they place first the fulfilment of their obligations to the public.

The Contractors' Part

As a past president of the I.M.E.A., Mr. E. E. Hoadley's views are vested with some authority when he deals with matters concerning the electricity supply industry. And the attitude to be adopted towards electrical contractors concerns that industry to an important degree. In his article in this issue Mr. Hoadley counsels co-operation with the contractors, and puts forward his own undertaking as proof of the possibilities. The Maidstone contractors do not get it all their own way, but they are apparently quite satisfied with the results. Messrs. Robinson and Morland referred in their I.M.E.A. paper to the allocation of wiring work to local registered contractors, and said that if they were allowed to canvass on behalf of the undertaking they would bring in many orders for domestic appliances. It looks as though the only chance of success in this matter lies in negotiations between each authority and its local contractors. According to the report to be presented to-day (Friday) at Harrogate little progress was made by the I.M.E.A.-E.C.A. Joint Committee during the past year.

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An Old Story

ONE outstanding feature of Councillor A. L. Boddington's I.M.E.A. paper is his protest against the bleeding of municipal supply undertakings for the benefit of local rate funds. This is one of the problems which have existed ever since such undertakings began to make money. While they were repaying deficits the practice had some justification; now it has none. At Croydon each consumer pays on the average 8s. 3d. per year in extra rates, although at the same time he contributes probably more than his fair share already in the rates paid by the undertaking in the ordinary way. This is hardly an inducement to use electricity even to the most civic-minded consumer. The only remedy seems to be to spend more out of revenue for capital purposes or to operate on a very narrow margin of profit. No amount of argument seems to prevail with some Finance Committees. Councillor Boddington also had something to say on the Central Board's dealings with selected station owners and in this connection the reader will find it useful to refer to the case for the grid put forward by Mr. J. W. Beauchamp on another page of this issue, as well as Mr. Lamb's remarks on the same subject in his presidential address.

A.R.P. Plans

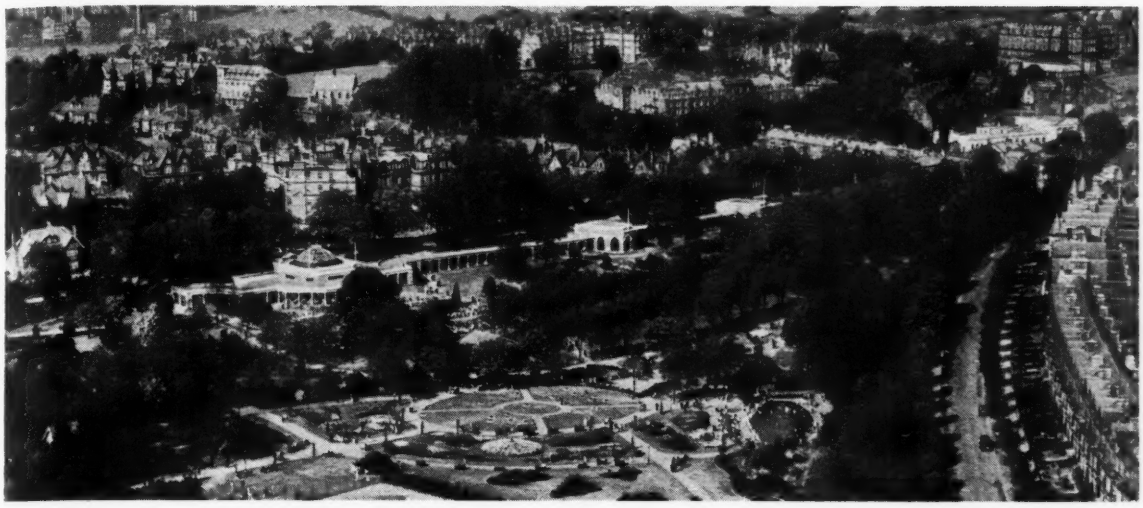
A FAVOURABLE impression left by Mr. J. M. Kennedy's I.M.E.A. paper was that "preparedness" in public supply undertakings is being vigorously tackled. Work is well in hand for the construction of reserve switchgear and other equipment, and the problem of delays in dealing with emergencies owing to the slow process of high-voltage jointing appears to have been solved for the reasons discussed by us last week. As there is little experience of A.R.P. requirements to go on, the setting up of a committee of the whole industry to assist the Electricity Commissioners as developments occur is certainly a step in the right direction. This committee will advise on what works will rank for grants under the Civil Defence Bill. Ordinary "good employer" obligations will not, of course, but how is the carrying out of the recommendations of the Fire Risks Investigation Committee to be regarded? Approved expenditure that has no peace-time value, such as temporary connections between two undertakings will be admitted for grant. This presumably would not cover the running of mains to provide stand-by to private plants (which generate about a quarter of the electricity used in this country) or apply to modifications required to ensure safety in sub-stations owned and occupied by consumers. One would like some assurance that the security of supply on industrial premises is receiving the same kind of attention as is being given to the case of statutory undertakings.

Trolley-buses Condemned

DELEGATES at the recent annual conference of the Scottish Road Passenger Transport Association having heard the paper by Mr. Stuart Pilcher, transport manager at Manchester, must have wondered why any town should adopt trolley-buses rather than motor-buses. Mr. Pilcher laid particular emphasis upon the advantages of motor-buses by reason of their greater flexibility, claiming that their ability to run two or more abreast and to overtake one another freely made them much more able than the trolley-bus to meet the requirements of present-day and future traffic conditions. Is it not questionable whether this interweaving of large vehicles makes for safe and speedy transit? Moreover, although trolley-buses must proceed one behind the other, their swift, smooth acceleration minimises delay. It was pointed out that with motor-buses only one type of vehicle was required and the equipment could be standardised to the utmost, simplifying the maintenance and repairs organisation. Against this it should be stated, as Mr. J. H. Parker (London Passenger Transport Board) mentioned in his article in our issue of January 27th last, that high-compression reciprocating engine vehicles need a much more costly maintenance system. At Brighton last week there was ample evidence of the popularity of trolley-buses, and during an inaugural run on a new route opened by the Mayor, Councillor J. Talbot Nanson, many appreciative comments were passed on their comfort, freedom from fumes, and silence. These attributes, after all, are of more importance to people than whether the bus they are on is able to overtake the one in front.

Selling Service

So many hares were started by the paper on electrical development and distribution given by Messrs. P. J. Robinson and E. L. Morland at Harrogate that the discussion inevitably tended to become somewhat desultory. This is not surprising, since each of the aspects dealt with merited separate treatment. With the large proportion of tabulated matter included, together with prints of sub-station layouts, the paper may be regarded as a mine of information, from which supply engineers can dig out as much as may apply to their own undertakings, but what suits a system as large as that of Liverpool Corporation obviously cannot meet the case of all and sundry. To reply on the spot to all the questions raised would have been equivalent to producing a second paper. One can certainly recommend that the paper should be kept as a reference manual of modern practice that has been well tested by the results it has yielded in a typically progressive undertaking.



THE HARROGATE CONVENTION

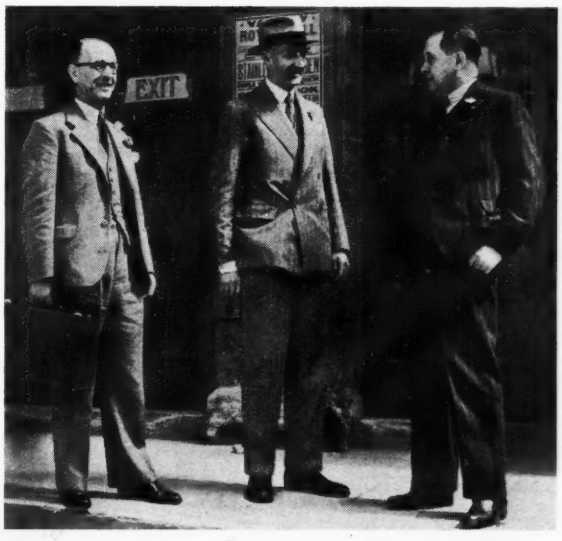
I.M.E.A. Delegates at Work and Play

HARROGATE, always a beautiful town, was looking at its best to welcome the 1,500 delegates to the forty-fourth annual Convention of the Incorporated Municipal Electrical Association when they arrived last week-end. Blazing sun and cloudless skies, with temperatures hovering near the eighty mark, augured well for a week to be packed not only with the reading of papers, discussions, and other business, but with its full complement of social functions.

Comments and photographs from our special representatives at the meeting. Convention papers are dealt with on pages 820 to 827

It is not to be wondered at, therefore, that the warmth of the weather caused the business side of the function to be forgotten until the official opening of the Convention on Tuesday morning.

The usual little groups of delegates discussing current electrical topics were few and far between, the golf course, the nearby beauty spots, or, most popular of all, a deck-chair in a shady, secluded corner, apparently having a prior claim on their attentions. Actually, on Sunday the thought did cross our minds that we had made some mistake about the dates, so deserted did the place seem. Wandering after lunch through the Hotel Majestic, the headquarters of the Convention, which for the next few days would not have a room vacant, we came across only about a half a dozen persons, though we were told that Mr. E. E. Hoadley, the honorary secretary, and Mr. J. W. Simpson, the secretary, had just arrived and were busy unpacking.



Mr. J. W. Simpson (Secretary), Mr. H. C. Lamb (President) and Mr. E. E. Hoadley (Hon. Secretary)

A minor thrill awaited those who arrived at Harrogate by the 2.30 p.m. train on Sunday. As if the place was not hot enough, or perhaps because it was so hot, a small fire started in a pile of rubbish down an alleyway facing the station, and the whole resources of the local fire brigade were called upon.

A few more delegates had arrived by the evening, and several were to be seen making or renewing their acquaintance with the town, deciding what illnesses they were going to have during the week, and which of the (is it fifty-seven?) waters they were going to take for them. Valley Gardens were particularly crowded; listening to the band appeared to be a very popular way of spending a couple of hours.

As it became dark the town took on a new and different beauty, and it was apparent at last that there was something of definite electrical interest happening. One by one the larger hotels and public buildings appeared out of the dusk in brilliant floodlighting. The Hotel Majestic seemed at once to assume its responsibility as the headquarters hotel, while the Grand Hotel, where so many of the other delegates were staying, made a most spectacular picture overlooking the Valley Gardens.

The Town Hall, too, treated with mercury vapour and tungsten lighting, was a pretty sight, though perhaps the illumination feature which attracted the greatest attention and comment was the nearby "Magic Tree." Situated directly opposite the Convention Offices at the Royal Hall, this consisted of a small tree or bush on which had been attached artificial flowers and creepers specially treated with fluorescent paint. Black ultra - violet - ray lamps concealed in the branches caused these to appear in the darkness in almost incredibly beautiful colours. The local inhabitants seemed to take a big interest in it, and we had to answer several inquiries as to "how it worked."

Many of the visitors were up with the lark on Monday morning; some actually arrived at the Royal Hall to register before "opening time," wisely

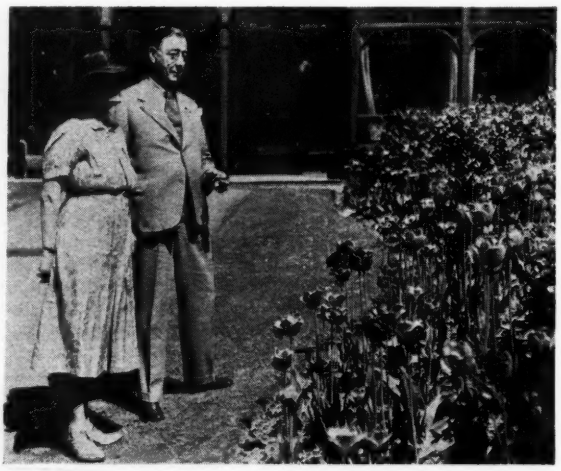
thinking, no doubt, that, having done their duty, they would have the rest of the day to themselves.

Mr. Neil McLean, the Harrogate borough electrical engineer and manager, was one of the first arrivals, and soon after him we noticed Ald. Sir Percival Bower (Birmingham) make a lightning visit. Messrs. A. J. Hutchinson and A. P. MacAlister, president and secretary

Mr. A. Nichols Moore (Chairman, E.D.A. Council) receives his badge

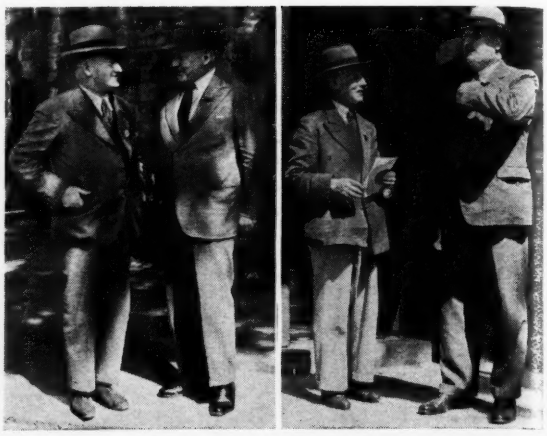
respectively of the A.M.E.E., were other early arrivals, and they were soon followed by Mr. A. E. Campbell (Stepney), Mr. and Mrs. R. Illingworth and Mrs. C. W. Key (Poplar).

A large contingent from South Wales arrived shortly after and we seemed to keep meeting all over the town all the morning. We came across them in the Royal Baths each consuming their full 10 oz. of Kissingen water, which is not so pleasant as its name might seem to imply, though we were assured that it was the nicest of the lot. Anyhow, the South Wales folk seemed to like it, and we later found them trying to get a bulk supply from one of the wells. We left them giving Stainless Stephen, the well-known radio broadcaster who is appearing in the variety programme at the Royal Hall in the evenings, the "low-down" about some of the delegates, no doubt for future reference.



Mr. and Mrs. T. A. G. Margary (Wolverhampton) admire a "Majestic" flower bed

The funds of the Electrical Industries Benevolent Association must have benefited more substantially than usual from the sale of flags, which is always a feature of the first day of the Convention. For a delegate must indeed have had a stony heart to resist the appeal of the bevy of beauty summoned to the aid of the E.I.B.A.



Left: Capt. J. M. Donaldson (Northmet) and Mr. W. E. Woodhouse (Yorkshire E.P. Co.). Right: Capt. A. J. Beckett (Bridlington) and Mr. F. S. G. Hinings (B.T.H.)

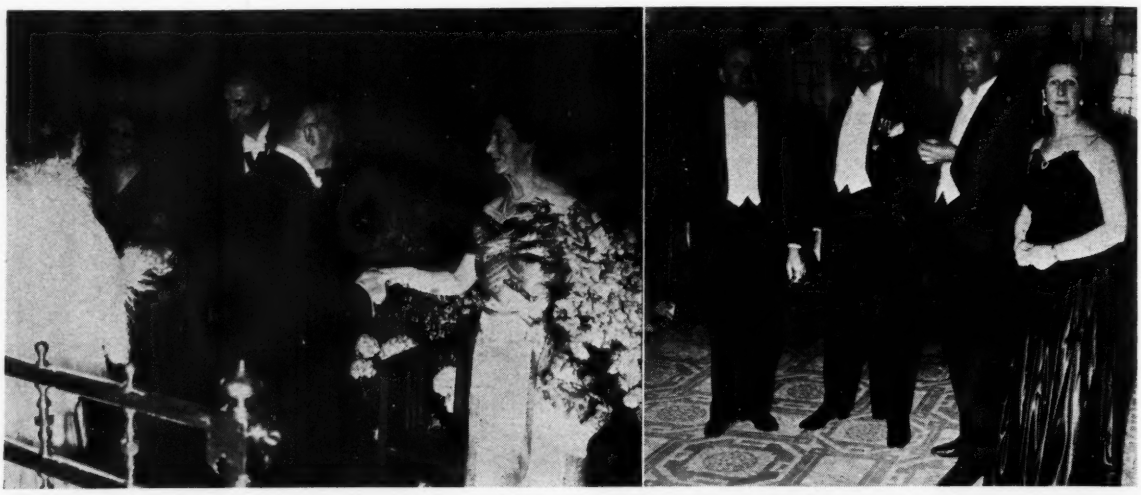
Registration and issue of badges continued steadily all day Monday, and there seemed all the while to be a goodly few at the offices. The number of delegates and non-official visitors to the conference is, of course, considerably smaller than in recent years, due to there being no exhibition. This feature of the conference has, indeed, been missed considerably—even though in past years delegates have not made as good use of it as they might have done. On Monday afternoon particularly there was a feeling that something was lacking, though, perhaps, delegates were relieved that duty did not call them away from the sunshine even for half an hour. Still, it is to be hoped that this function will be revived at some future conference — when the weather is not so favourable!

There is, too, none of the little private displays of apparatus which it has been customary for a number of manufacturers to arrange in local premises during the Convention week. No, not even Johnson and

Mrs. A. J. Newman (Bristol), Mrs. A. A. Senington (Bristol), Mr. and Mrs. B. Handley (Portsmouth) and Mr. A. J. Newman

Some of the Delegates and Visitors at Harrogate

1. Mr. S. H. Fowles (Heston and Isleworth), Ald. J. Woulfe (Heston) and Mr. R. C. Taylor (Santon, Ltd.). 2. Sir Montague Hughman (Henley's), with Councillor and Mrs. A. L. Boddington (Croydon). 3. Mr. and Mrs. R. Illingworth (Poplar), Mrs. C. W. Key (Poplar), and Mr. A. E. Campbell (Stepney). 4. Miss E. Fowles, Ald. Woulfe, Mr. W. J. Chaplin (Colwyn Bay), Mr. S. H. Fowles, and Mr. S. J. C. Ellis (Tonbridge). 5. Mr. J. N. Waite (C.E.B.) on the links. 6. Mr. A. J. Hutchinson (president A.M.E.E.), Mrs. Hutchinson and Mr. A. P. McAlister (hon. sec., A.M.E.E.). 7. Mr. and Mrs. P. J. Robinson (Liverpool), and Mr. Price F. White (Bangor), buy their E.I.B.A. flags. 8. The South Wales Contingent. 9. Mr. P. J. Robinson, Mr. and Mrs. R. P. Sayers (Philips Lamps), and "Garry." At the top centre is a gathering of delegates outside the Convention office on "registration day."



Left: The President and Mrs. Lamb receive the Vice-president (Mr. J. Mould, Leicester) and Mrs. Mould. Right: Mr. F. Nicholls (Leeds), Mr. and Mrs. Garside (Crompton Parkinson) and Mr. R. H. Gummer (International Combustion)

Phillips, though many of their friends have been invited to the Prospect Hotel, where Mr. P. V. Brittlebank dispenses beer (which is apparently laid on through a water heater) in glasses ornamented with gaily-dressed girls who are not, however, so modest as they appear at first glance.

A dart-board in the room adjoining the cocktail bar has provided much good-hearted rivalry.

With no business functions to worry about, many of the delegates spent a good deal of Monday on the golf course at Starbeck. Mr. J. N. Waite (C.E.B.) seemed particularly keen to capture the G. P. Dennis Trophy Competition run in aid of the I.E.E. Benevolent Fund, and was on the links both morning and afternoon. After lunch he had a round with Mr. G. G. L. Preece, of Bruce Peebles, Ltd., who has organised the competition.

In the evening delegates had a chance of "getting together" at a reception given by the President, Mr. H. C. Lamb and Mrs. Lamb. The programme included a cabaret performance.

Sitting out: Mr. and Mrs. T. Roles (Bradford) and Mr. M. G. S. Swallow (Richardsons, Westgarth)

Despite the weather there was an excellent attendance on Tuesday morning for the official opening of the convention. Extending a hearty welcome to the visitors, the Mayor of Harrogate, Councillor Herbert Dawson, reminded them that it was twenty-seven years since the Association last visited Harrogate and he hoped that it would not allow such a long period to elapse before coming again. With the opening of the extension of the baths by the Lord Mayor of London this month, the town would have the finest set of baths in the world and within two and a half hours' journey there were no fewer than 129 dales and valleys, 61 ancient ruins, 106 stately homes and 52 rivers. He hoped the delegates would take the opportunity of visiting some of them.

Harrogate, he said, could

Above: Mr. Lamb is seen delivering his presidential address, while below we reproduce pictures of the delegates at work and play (if dancing can be considered such this hot weather !)

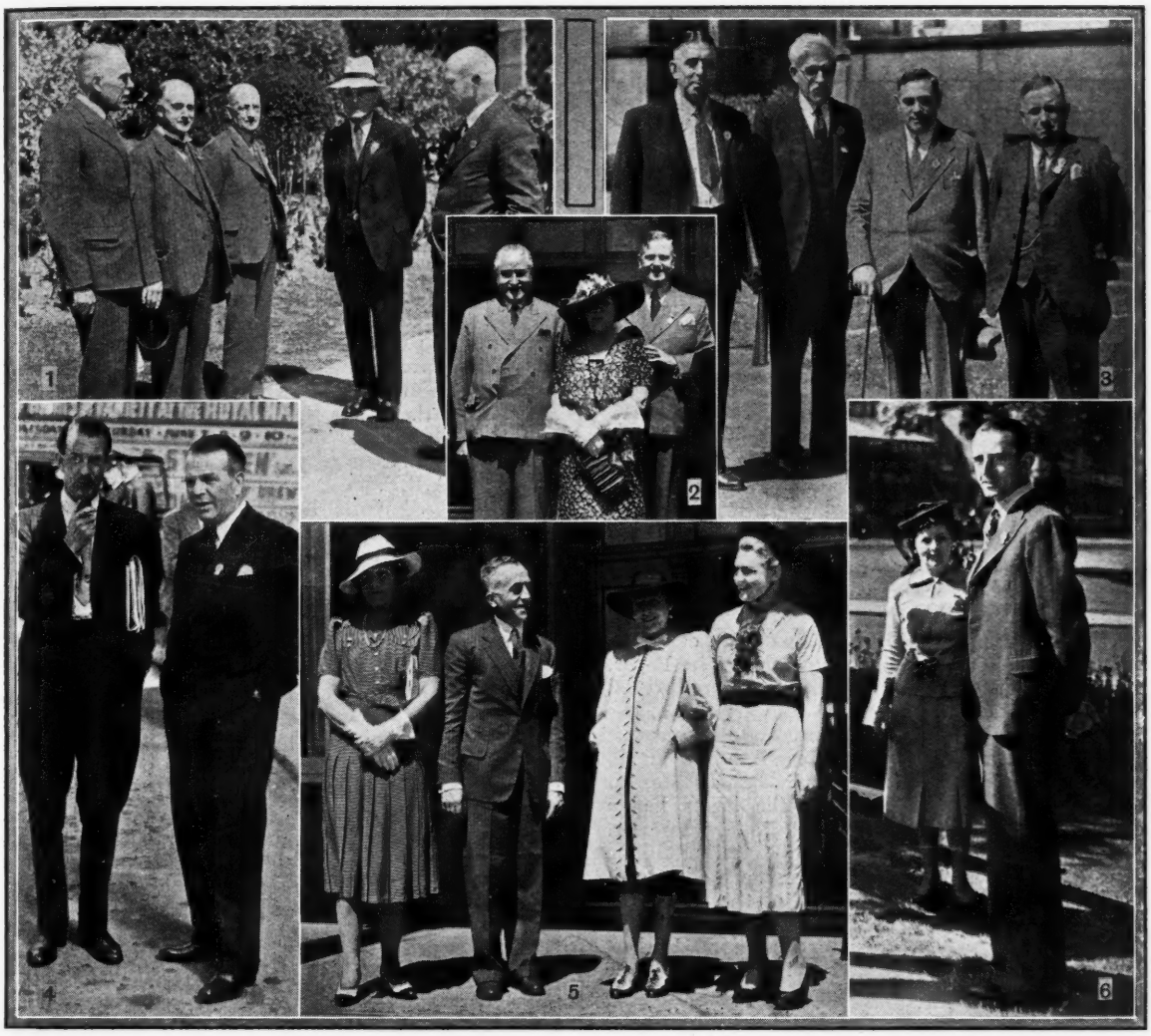
also boast a small but very efficient electricity undertaking and a reliable, cheap and abundant supply of electricity was available throughout its 296 sq. mile area and still a profit was being made. He made so bold as to suggest that, if every municipal undertaking represented at the conference had had as good a record, there would have been no need for the McGowan Report.

Thanks to the Mayor for his welcome were tendered on behalf of the Association by the President, who afterwards proposed that a telegram should be sent to Lord Tweedsmuir, Governor-General of Canada, conveying loyal greetings to the King and Queen and expressing the wish that their tour would help to cement still further the friendship between this country and Canada and the United States. This proposal was accepted with acclamation.

As Mr. Lamb himself mentioned, the presidential address, a report of which appears on another page, contained many provocative assertions which would no doubt have produced some interesting discussion if this had been permitted. Gently chiding members of the gas industry for wanting "protective legislation" and "preferential treatment" similar to that meted out to the electrical industry, the President caused some amusement by suggesting that, if the gas industry proposed to petition Parliament for a Central Gas Board or for Gas Commissioners, they could promise in advance the keen support of the electrical industry.

His comments on the treatment of selected station owners also aroused murmurs of approval from certain quarters, though there were some, we felt, who would have liked to have disputed his justification of expenditure on the grid scheme. Consumers no doubt will find comfort in his remark that falling charges may be expected to continue for a long time to come. He thought that there was small prospect of any big scheme affecting distribution maturing in the near future.

On the topic: "Public *versus* private ownership," most of the delegates would no doubt have welcomed an opportunity to put in a word.



Top left: Messrs. A. C. Cramb (E.D.A.) and E. Seddon (Edinburgh) with Councillors Walker and G. S. Gardner (Edinburgh) and Alderman W. Walker (C.E.B.). Top right: Mr. A. E. McKenzie (Wimbledon), Ald. W. Hickmott (Wimbledon), Mr. F. N. Rendell Baker (Croydon) and Councillor F. Gardner (Croydon). Centre: Sir Percival Bower with Mr. and Mrs. F. Forrest (Birmingham). Below (left): Mr. R. E. Trevithick and Major J. Murphy (E.R.A.); (centre) Mr. J. Mould (president-elect) with lady visitors; (right) Mr. H. Breckell (Gainsborough) and Mrs. Breckell.

A vote of thanks to the President was proposed by Sir Leonard Pearce (London Power Co.) and seconded by Mr. A. E. McKenzie (Wimbledon), both of whom served with him at Manchester some years ago. Breaking up for lunch, rotarian delegates were entertained by the Harrogate Rotary Club at the Crown Hotel.

Apparently the call of the open air was too much for most of the delegates in the afternoon, for there was a very poor attendance to hear the paper on "Some Aspects of Electrical Development and Distribution" by Messrs. P. J. Robinson, Liverpool city electrical engineer, and E. L. Morland. This was a pity because the subject is a very live one and appeared to perplex many of those that were present.

One point arose very forcibly from the discussion. This was that a policy which might be suitable and advantageous to a large undertaking was not necessarily applicable to a smaller one having heavy bulk supply

charges to meet. The provision of special low tariffs for such services as thermal storage was a case in point, bulk supply charges payable by some undertakings being higher than the rates offered by larger undertakings to their consumers. A revision of bulk supply tariffs or, as Mr. J. W. J. Townley (West Ham) suggested, the introduction of special three-part tariffs for definite off-peak loads were the only solutions offered.

Two pleas by Mr. W. N. C. Clinch (Brighton) will certainly find many adherents. One was for the abolition of the practice of utilising profits of an electricity undertaking for the relief of rates, while the other was that no particular electrical service should be singled out from others for preferential treatment. On the other hand, Mr. F. W. Purse (London J.E.A.) will find many to disagree with him when he says that electricity is too cheap. His opposition to a forced change-over from DC to AC, however, has something to be said in its favour, though it would seem on the face of it the longer standardisation is postponed the more expense and trouble it will give in the end.

Mr. F. W. Purse (London J.E.A.) besieged by flag-sellers

Having had a good deal of experience in coping with an amalgamation of undertakings just such as was proposed in the White Paper, Mr. Purse's observations on this subject were listened to with particular interest. He considered that the I.M.E.A. was the body to deal with the problem of reorganisation and it should be prepared to face it.

While the menfolk were busy discussing Messrs. Robinson's and Morland's paper, the ladies had a session of their own at the Hotel Majestic, where Dr. Dorothy G. E. Potter gave them an interesting talk on "Health and Harrogate." There was a good attendance and Mrs. H. C. Lamb, wife of the President, entertained them to tea. In the evening the Mayor and Mayoress of Harrogate, Councillor and Mrs. Herbert Dawson, were hosts at a concert and dance held at the Royal Hall.

Wednesday morning's paper dealing with "Some Financial Aspects of Municipal Electricity Supply" was of special appeal because the subject is still a very live and bewildering one. The author, Councillor A. Lester Boddington, who finds time among other things to be chairman of the Croydon Corporation Electricity Committee, has made a profound study of the subject and few can rival his knowledge. It was he, it will be remembered, who spoke on behalf of the municipal undertakings in the broadcast discussion a few months ago on the respective merits of municipal and private ownership of electricity undertakings.

Good weather is always essential on the Wednesday afternoon of an I.M.E.A. Convention for it is then that the garden party is held. This year the fates were more than kind and the sun continued to blaze away in true garden party style. Before tea at the Sun Pavilion, Valley Gardens, those fortunate ones who were able to secure the very limited number of tickets available paid visits to Fountains Abbey or Harewood House, about 250 going to each.

"Advertising and Publicity" which formed the subject of yesterday morning's paper by Mr. A. C. Cramb, director of E.D.A., is a matter to which far too little attention is paid, yet it is one which must inevitably grow in importance as the education of the consumer is proceeded with.

Yesterday, too, was the official Electrical Association for Women's day and, as usual, a special luncheon was

Taking the waters

organised in connection with it. So popular has this function become that all tickets for it were sold out weeks ago and the Queen Hotel was packed to capacity. After lunch the E.A.W. members were invited by the Harrogate Electricity Committee to see a mannequin parade at the Valley Gardens where they were later given tea.

In the meantime at the afternoon session at the Royal Hall there was being read perhaps the most topical paper of them all, namely, that by Mr. J. M. Kennedy, deputy chairman of the Electricity Commission, on "A.R.P. in Relation to Electricity Supply Undertakings." We all hope and pray that war is not inevitable but in the meantime it is comforting to know what to do if the worst should happen.

Last night delegates had their third (at least!) "night out" this week. This was on the occasion of the annual banquet and ball which was held at the Hotel Majestic.

This morning (Friday), after a meeting of the I.M.E.A. Council the ordinary general meeting will be held. If the fine weather continues we are prepared to wager that business will be concluded before lunch, leaving the afternoon free for the coach trips arranged to the Yorkshire Dales and Rowntree's Chocolate Factory at York. Many of the delegates have booked seats for the "official visit" this evening to the variety

Fluorescent tree (B.T.H.) outside the Royal Hall

concert at the Royal Hall. Those who have already been say that the show is well worth seeing.

As a fitting conclusion of this very full week arrangements have been made for delegates to visit the Kirkstall (Leeds), & Thornhill (Y.E.P. Co.) power stations to-morrow morning.

Convention Proceedings

Presidential Address

By Mr. H. C. Lamb, M.Inst.C.E., M.I.E.E.

THE president's address (delivered on Tuesday morning) surveys some of the important aspects of electricity supply which are of interest to-day, his comments not being entirely uncontroversial.

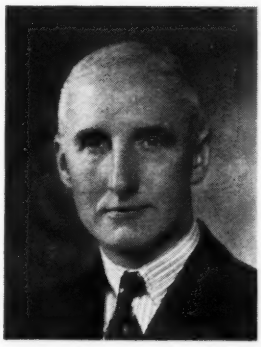
Commencing with a comparison of consumptions per head of population in twelve countries, Great Britain is shown to be tenth on the list, with 588 kWh, of which 174 kWh is derived from private industrial plant and 414 kWh from public supply sources. Thus when public supply only is counted Great Britain becomes seventh, but the only European countries with higher figures than those of Great Britain (for output from electric public utilities) possess substantial hydro-electric resources and some have very largely electrified their railways.

From the President's statistical tables it appears that in all categories Great Britain has merely arrived to-day at the stage reached some years ago by those communities where the use of electricity has developed most rapidly. It is not unreasonable to conclude, therefore, that consumption of electricity will continue to rise in Great Britain until it reaches a figure considerably in excess of that which has so far been attained. A complete change-over from private to public generation would increase the sales of public supply undertakings by at least 30 per cent.

Gas Claims Refuted

The most enlightened gas engineers now recognise that some measure of competition between two such industries cannot be avoided, and is, in fact, good for both. Great public utilities, without the incentive of competition, run the risk of becoming indolent. In only a few cases has joint management and control of gas and electricity been attempted, and enthusiasm for the idea seems to have evaporated.

The principal spokesmen of the gas industry have developed a line of argument which demands attention. Recently, the President of the National Gas Council said that fair competition without hidden subsidies was exactly what the gas industry welcomed. He admitted that such competition would yield to electricity not only industrial and domestic power, lighting and railway transport, but also some part, though, in his opinion, not a large part, of the immense field of domestic heating.



Mr. H. C. Lamb, this year's President of the I.M.E.A., is chief engineer and manager at Manchester.

This change in the attitude of our competitors is gratifying; Mr. Lamb readily admits the reasonableness of the statement quoted, and would commend it to those municipal authorities who appear to think that competition between the two industries is harmful and not in the public interest.

When capital and other fixed charges form a very large part of the whole cost of production diversity of demands is a vital factor; numerous applications, making possible the use of plant and mains for much longer periods, permit lower charges for power and heat as compared with light.

While the total mid-winter maximum demand on the Manchester undertaking is 200,000 kW, the known consumers' connections for room heating alone exceed a total of 200,000 kW. The annual consumption of electricity by these radiators must be considerable, but though their simultaneous maximum demand at the time of system peak cannot be ascertained, it is certainly not very large.

The president of the National Gas Council, in his Manchester address contended that "to meet the Sunday cooking load of the London gas companies would require two and a half times the total installed capacity of generating stations serving the metropolitan area. Taking a figure of £60 capital expenditure per kW installed, such an expansion would need £300,000,000." Mr. Lamb shows that such figures bear no relation to the actual state of affairs, for there are 370,000 electric cookers already installed in Greater London and the simultaneous demand for this large number, as is known by experience, will not exceed 314,000 kW. The Central Electricity Board has informed Mr. Lamb that, during the past winter, the weekday maximum demand on the whole of the power stations serving Greater London exceeded the Sunday load at mid-day by 860,000 kW. There is, therefore, at present, plant capacity available on Sunday mornings to supply the demand of 1,010,000 additional electric cookers, which, supposing they were connected, would bring the total number of cookers up to 1,380,000.

This illustration merely emphasises the fact once more that diversity of demand has an effect on our economy which other industries not so placed find difficult to realise. While admitting, therefore, that there are at present limitations to the use of electricity for space heating, there are no such limitations in sight in the case of cooking, water heating and many processes in industrial heating, which are becoming of great importance to the electrical industry. The high load factor of storage water heaters alone is extremely valuable in furthering utilisation of plant and mains, and the load is peculiarly capable of adjustment by control arrangements, either on a time or load basis.

It is sometimes stated that the output of the gas utilities exceeds that of the electrical utilities because the heat equivalent of the total electricity output is only 44 per cent. of the heat content of the total gas output. If the whole of the electricity produced were sold for heating purposes this would be a reasonable comparison. In the actual circumstances, however, the comparison has little meaning. It is of more interest to know that the total revenue from the sale of electricity has overtaken the revenue from the sale of gas and appears likely to leave it far behind. The striking difference between the characteristics of the two sales curves would seem to indicate that, while one of these industries may be approaching saturation, the other has a long way to go before that stage comes in sight.

Selected Station Owners

Events have shown that the capital cost of the national interlinking grid was underestimated, as was also the cost of frequency standardisation, as the actual figures to the end of 1938 were £39 million and £17 million respectively against estimates of £29 million and £10.5 million by 1940. For obvious reasons, therefore, the estimate of the annual expenses of the grid per kWh of output was also insufficient. On the other hand, the estimate of the consumption of electricity has proved to be remarkably accurate.

In practice, most of the 106 selected station owners find, to their disappointment, that their position in the grid scheme is this—first, they have provided the heavy demand which makes practicable large-scale production; secondly, they have supplied the technical staff required for construction and operation of efficient power stations; and, thirdly, they have raised the capital and built the stations on sites which would give the lowest cost of production. With the object of securing the best water and coal facilities, power station sites are very often situated outside the owners' areas of supply, thus contributing to the rateable value of other local authorities. The more efficient a generating station is, the more it is used by the Board, and the greater the production sent in to the common pool.

Should the owners of a selected station supply their neighbours in bulk, they are compelled to supply at the bare cost which they pay for the electricity, plus the cost of transmission. For their services to the scheme, these selected station owners receive no recompense, and it is hardly surprising that this purely altruistic part is accepted with a complete absence of enthusiasm.

The answer to the question whether the results obtained come up to expectations must, therefore, be that to the greater part of the electricity supply industry the grid scheme has not realised expectations. For this result the Central Board is in no way responsible. The Board has, in fact, expressed its readiness to enter into a special agreement with the whole group of selected station owners in each area with the object of ameliorating (so far as lies in its power) this injustice, though in only one area (North-West England) is such an agreement now operating. The agreement does not, however, affect the general position, namely, that few of the large selected station owners have, on balance, derived financial benefit from the 1926 Act.

Nevertheless, in Mr. Lamb's opinion the expenditure on the grid has been justified, for many authorities have found it to their advantage to purchase electricity either at the grid tariff

or by special arrangement with the Board, or indirectly on the basis of Section 12, and these clearly have already received benefit. The Board's financial position is a very sound one and gives promise of greater benefits in the future.

It is not easy to assess precisely the net financial gains to the industry as a result of the Board's operations.

Mr. Lamb's opinion is that the saving in works cost to be credited to the grid is 20 per cent. Applying this figure to the calendar year 1938 he calculates the saving in capital charges (£22 millions at 8 per cent.) to be £1.76 millions and works costs [million 24,000 kWh×(0.219d.−0.175d.)] to be £4.4 millions, which together make £6.16 millions. Deducting the cost of C.E.B. expenses at £3.85 millions leaves a net saving due to the grid of £2.31 millions, which represents about 6¼ per cent. on the total cost of production (including the Board's expenses).

The additional annual charge for standardisation of frequency, for which the levy on the industry amounts to approximately £¾ million per annum, has been ignored. This result must be regarded as satisfactory after only five years' operation, and, provided output continues to rise, the saving may be expected to increase each year in the future.

Distribution

In the past, the principal reason for lowering charges to the consumer was the spectacular fall in the cost of generation. Because no such fall had been shown in the cost of distribution, there was a tendency to draw certain conclusions for which there was little justification. Insufficient weight has been attached to the unprecedented activity in constructing electricity distribution systems during recent years. The burden of distribution capital charges passed its maximum about six years ago and has since become progressively lighter. This downward trend will continue in the future.

In Manchester during the last eleven years 58,000 consumers have been changed from non-standard voltage and 43,000 consumers have been changed to AC. It is anticipated that this work will be completed in three more years at a total cost of almost one million pounds. The cumulative savings in standing charges and operating expenses made due to this change during the past eleven years, and the estimated savings to be made during the next 6¾ years, will, by that time, have liquidated the whole of the million pounds spent. As, however, this great piece of work has been financed from revenue, the benefit of a 5 per cent. reduction in total expenditure will be felt immediately it comes to an end.

It has also been fairly common practice to purchase what are called short-lived assets out of revenue, and large sums have been found annually for meters, cookers, and waterheaters. Experience has shown that the life of such apparatus is longer now than it used to be, and in view of these facts, falling charges to consumers may be expected to continue for a long time to come.

Management

The fundamental merit of municipal ownership is that it has only the public interest to consider, while the excellent security offered to the lender enables money to be borrowed on the most favourable terms possible; the weakness of the system is the disinclination to take risks and the strong tendency to spend capital only on what has already become a proved success. Another weakness is the reluctance to recognise that, when large interests are involved, ability is all-important and should be paid for, while mediocrity is dear at any price. This matter is a cause of great concern to all who have the welfare of municipal trading at heart.

Some municipal authorities consider it a good plan to divide the managerial function into two parts, appointing a chief engineer to control the technical staff and a manager, without engineering experience, to control the remainder. This experiment has been tried in a few cases, but seldom, if ever, with success. Mr. Lamb says, without the slightest hesitation, that divided responsibility and control is a bad method and one usually given up with relief by those who try it.

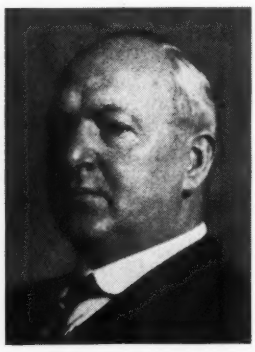
Development and Distribution

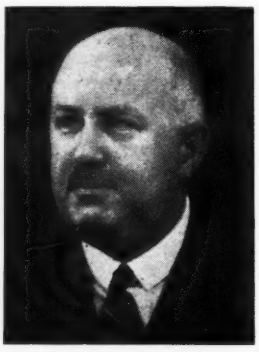
Paper Read by Messrs. P. J. Robinson and E. L. Morland at the Tuesday Afternoon Session

CONSUMERS' requirements are everywhere increasing at such a rapid rate that distribution systems must be so designed as to make them capable of quick and economical expansion. Certainly much more attention and expenditure will have to be devoted in future to efforts to increase the sale of energy to existing consumers, and to the addition of new ones.

But in this paper, with its fourteen statistical tables and thirty-one diagrammatic appendices, the authors state that it is "just questionable" whether the organisations of electrical undertakings as at present constituted are sufficiently developed, or equipped in the best way, for dealing strenuously with and giving whole-time to this essential need.

The paper commences with examples of typical development of suburban estates in the Liverpool area. The houses





[Elliott & Fry.

Mr. P. J. Robinson is city electrical engineer of Liverpool and Mr. E. L. Morland (right) is also at Liverpool

are inexpensive, of normal type and appearance. The authors give very full plans of the distribution system layout, positions of the domestic appliances installed, typical load curves, consumption figures and financial results. The policy of arranging with the builders of all new houses to install cooker wiring and fittings while the property is in course of erection has been effective since 1925. The consumer or property owner defrays the cost of that portion of the service line laid upon private property.

On one municipal estate of 253 houses the average installation totals 18 kW and the consumption 3,988 kWh per house per year (against 200 kWh for lighting) so that the effect of using electricity for all purposes is to increase the consumption about twenty times. The houses are typical, the only exceptional feature being the complete electrical equipment installed and maintained in each house without additional charge.

Adjacent to a recently created large air-port and an area being successfully developed for industry it was decided to build a complete and self-contained satellite town for housing 7,500 workers' families. The results for the portion just completed (680 houses) indicate that satisfactory returns on the expenditure may be expected. The total load of the whole estate will be 30,000 kW, exclusive of street lighting, shops, cinemas, etc.

In some existing areas printed propaganda induced only one in five consumers to use electric cookers on simple hire. Therefore direct canvassing was adopted and suitable staff chosen to seek out the incoming tenants on a definite routine system with the object of persuading them to adopt electrical methods of cooking and washing, &c. As evidence of their enterprise, the staff in exceptional cases travelled as far afield as Manchester, Stockport, etc., to interview the tenants in their homes and secure their orders.

The Housing Department of the Municipality provides a gas-heated washboiler as part of the housing equipment, but it has been possible, by direct canvassing carried out in severe competition with the company providing the alternative method, to obtain 592 out of 680 or 87 per cent. electric cookers; also 510 out of 680 or 75 per cent. have discarded the washboiler provided free and hired an electric washboiler at a weekly rental.

On estates developed by private enterprise the builders were persuaded to adopt electrical methods and refused to allow the means of an alternative method to be provided whether in the roads or houses, and exercised this control until the roads were permanently surfaced and finally adopted by the local authority. No difficulty was experienced in selling the houses to owner occupiers or renting to tenants and the builders effected a considerable saving on their outlay by

adopting one method. Since the roads were adopted the company providing an alternative method has broken up the pavements and laid down pipes in the roads but up to the present after intensive canvass only 12 out of the total of 381 consumers in these particular roads adopted the alternative method and one has already reverted to electric cooking.

The estates referred to embrace a total of 1,171 houses and are four in number; a fifth is shortly to be commenced and the electrical method will again be adopted.

These examples tend to show that it is to the great advantage of an undertaking to cultivate the builder in order to win him as an ally to further the use of electrical energy. The authors feel there is not sufficient co-operation between the builders of new property, the architects who design the houses or estates, and the manufacturers and retailers of electrical appliances in order to assist consumers to dispense with any other method except the electrical one and avail themselves fully of all the electrical advantages which can be provided.

In private dwelling houses assessed at from £20 to £40 the average consumption per house amounts to 7,824 kWh per annum at an average all-in price of 0.4875d. per kWh. Cookers, wash boilers, water heaters and radiators are on simple hire from the undertaking.

Possibilities in New Buildings

Regarding new buildings available for electrification, the number of dwellings for which plans were approved by 146 of the principal local authorities last year was 120,915. The average cost per dwelling amounts to approximately £496. The total value of the electrical installations and appliances to be fixed in these houses should be approximately 10 per cent. of the average cost of the house to provide for a fairly complete range of electrical appliances for every-day use, whereas it may only amount to 2 and 3 per cent. The total consumption might amount to approximately 21.4 per cent. of the yearly increase of kWh sold in this country during 1937 as compared with that of the previous year.

Following particulars of thermal storage heating installations, the authors describe the progress being made by the Liverpool Corporation in developing rural areas, totalling 81 square miles with a population of 430 persons per square mile; 84 per cent. of the area is completely agricultural. Of a total of 536 farms and smallholdings, 361 are using electrical energy, the ratio of cookers is now 1 to each 3 consumers, and the average consumption, which has steadily increased, is 1,488 kWh. The year 1938 compared with 1936 shows an addition of 7 per cent. Four district showrooms have been provided at which accounts can be paid by consumers, and it is intended to increase the number as the opportunity occurs.

The high- and low-voltage lines are standardised; cost of materials and other details are included in the paper.

It has been necessary to erect 1,485 wooden poles and fix 979 stays on private property. The annual rental paid for wayleaves amounts to £199 per annum, and when capitalised at 4 per cent. only represents the small additional cost of £37 3s. per mile, so it can be fairly claimed that the farmers in this rural district welcome electricity supply.

Appliances on Hire

The great popularity to-day of the electric cooker and other hired appliances is evidenced by the phenomenal growth in the number connected to the distribution system. The first hired cooker was connected during the year 1923 and the total number connected is now 33,649. At present a cooker is connected to the system every 15 minutes of the day.

On the various municipal housing estates an all electric tariff is available, namely, 1s. per week, collected with the rent, plus ½d. per kWh. The consumer can hire a standard or kitchenette cooker and washboiler (including wiring up to 50 ft. and free maintenance) for an additional 5d. or 4d. per week, according to the type of cooker chosen; this sum is also collected with the rent.

Water heaters are of two types, the first for the conversion of existing hot water systems by fixing one, two, or three 2 or 3-kW thermostatically controlled immersion heaters in the cylinders, which are lagged with four layers of corrugated cardboard, and covered with green Willesden canvas. The second type of heater consists of a 1½ gallon "push through" tank, the loading varying from 500 W to 2 kW, according to requirements.

If it is agreed to give the wiring installation work to registered electrical contractors and they are provided with lists of approved consumers and allowed to canvass them and exhibit cookers and appliances in the shop windows possessed by many contractors, it will be found that they will bring in many orders for cookers, washboilers, water heaters, &c., and the rate of additions to the system in any area can be controlled by the rate at which the lists are released to the contractors.

The provision of rapid and efficient service to consumers is one of the duties of an undertaking of the utmost degree of importance in creating a feeling of reliability in the mind of the consumers. The requirements of the various sections have necessitated the provision of a fleet of 59 motor vehicles which covered 733,984 miles during the last year. In connection with service to cookers, other hired appliances, and general requirements of consumers, the calls at present average 220 per day. The servicing and repair of these vehicles is carried out by the undertaking.

Rates and Charges

The Liverpool undertaking is the highest rated in the country, and over £300,000 plus rate relief of £70,000 had to be earned last year, or over £1,000 per day, to provide for the necessary payment. The authors point out that this undertaking has shown that it is not necessary to charge high kWh prices in order to pay the highest rates in the country. The energy sold during the last ten years increased by over 100 per cent. to a total in 1938 of 473,258,131 kWh.

The domestic peak load occurs in general on Sunday between 12.30 and 1 p.m., though the times vary outside this period due to purely local conditions. This peak load for the districts covered by the test amounts to 5,594 kW for a total of 13,444 consumers with 4,289 cookers connected, representing an average of 1.3 kW per cooker. The Christmas Day cooking peak exceeded the normal Sunday peak by 48 per cent. to 61 per cent. This represented a load of approximately 2 kW per cooker connected. In part of one estate the load factor on a typical Monday was 47 per cent. for the 24 hours, helped by the use of wash boilers of which there are 94 among 245 consumers.

Radiator load with all its implications has been the subject of much discussion. The problems of load factor and peak loads are fundamental and must be continually faced. The financial difficulties which have become so pronounced recently have been accentuated by the present small load factor. All the energy used outside the period for which the maximum demand charge of the Central Electricity Board is made would assist in paying this charge.

It is therefore apparent that the use of radiators must be encouraged during the periods outside the peak hours by suitable tariffs. Further attention and research will require to be given to the design of apparatus in order to obtain a fixed and continual use of electric heating in place of present methods.

Distribution Aspects

Mains, service lines and other distribution matters are dealt with in the last portions of the paper—mostly descriptive, but operating results are given. For example, the policy of laying telephone cables with all high-voltage power cable extensions has made available an extensive network of 7-pair and 19-pair 20-lb. conductor air-spaced cable, lead sheathed, steel tape armoured, and protected with suitable hessian tapes. In addition to providing for telephone services to the power stations, and static and manually operated sub-stations, the wires are used for distant control of mercury arc rectifiers supplying the tramway system, for transformer temperature control warnings, for controlling the syrens for air raid warnings, and providing duplicate telephone services to certain police headquarters in connection with air raid precautions. Also a scheme is gradually being evolved so that the high-frequency impulse transmitters fixed in the sub-stations for centralised switching of street lamps can be simultaneously controlled through the telephone system, from one switch point. The telephone system is operated from the head office of the undertaking.

Low voltage distribution is limited to a distance of ¼ mile from the static sub-stations, and this policy has been found by subsequent experience to be sound in practice.

In the great majority of cases it is possible in the event of a complete failure of a sub-station to divide up the area into sections and reconnect them to the adjacent sub-stations. The sub-stations are not interconnected through the low-voltage networks, disconnecting links removed from the network disconnecting boxes for the purpose of separation are replaced with teak links coloured red. The exception is where centralised switching of street lighting by a high-frequency impulse is in operation, the neutral conductors are then connected across at the separation points by a condenser, which permits the high-frequency impulse to pass in order to operate the relays in the street lamp columns. From one transmitter over 450 lamps can be operated in a district consisting of two areas each of ¼-mile radius and separately supplied from a sub-station in each area.

When the assisted wiring scheme was introduced it was quickly foreseen that hundreds of applications for supply would be received from tenants living in property where it would not be economically possible for supply to be provided underground. Overhead cleated wiring effected considerable saving in the distribution costs and overcame the difficulty.

The 7/.064 cables are at first two in number and are supported in porcelain cleats fixed under the eaves of the houses, or if that is impossible under the bedroom window sills. As the load increases two additional cables are erected, making a complete four-wire distribution. In the case of a block of houses, the connection from the underground distributor is made by fixing an iron pipe and junction box on the front of the end house. The tough rubber cables are run through and connected at one end to a small underground fuse box fitted with a surface frame and cover. The other ends are taken to the cleats through the junction box which is afterwards filled with compound.

The 7/.064 services are taken into the houses either through the fanlight frame or through a two-hole porcelain block built into the wall and sloped downwards to the outside to avoid ingress of moisture. The cables tapped solid on to the cleated wires are insulated with a compound vulcanised on site. A simple form of wayleave is obtained based on a peppercorn rental, and subject to six months' notice from either of the parties.

No Trouble Experienced

To-day, due to the rehousing policy of the Liverpool Corporation, certain of the properties afforded a supply in this manner are being demolished and the material is recovered and used elsewhere. Some hundreds of miles of wiring have been erected, and by this method 32,440 consumers are supplied out of a total of 187,000. The first lengths were erected in 1930 and no trouble of any description has been experienced; the insulation to-day is in perfect condition.

Following details of various types of sub-stations and their equipment, the authors urge the desirability of standardising voltage throughout the country as soon as possible. In the Liverpool Corporation's area there are 174,591 consumers on the AC, three-phase, 50-cycle system at 400/230 V, plus 11,000 consumers on the DC system at 460/230 V, while 1,409 consumers have AC at 115 V in a non-standard area more recently taken over.

Discussion

MR. W. E. KIDNER (Barking) remarked on the absence of capital cost figures from the authors' statistical tables. These tended to show that the rateable value system of charging was not the proper one for areas where development was intense. In his own case figures of annual maintenance for cookers, water heaters and wash-boilers (which were expensive to maintain) were similar to those for Liverpool, involving added heavy capital cost in respect of the stores department for carrying out such work.

MR. W. P. LILWALL (Fleetwood) described the paper as a text-book. His undertaking collected the standing charge in a similar way to the authors', but he thought one shilling a week to be somewhat high as it represented nearly 20 per cent. of the rateable value of the class of house concerned. He used penny slot meters to collect the kWh charge, the penny being the only coin not thought worth while to file down for insertion in slot meters.

The day had gone by when they had to approach builders cap in hand, and builders were not now looked upon as nuisances who built houses where there were no mains. Electricity undertakings should on their part see to it that builders' requirements were met with the least avoidable delay.

It was doubtful whether the hiring of radiators was a commercial proposition; but there ought to be room for a good deal more thermal storage heating and the C.E.B. would have to concede something to customers with respect to cost of generation at particular times of thermal storage input. Selling energy by clever methods would be useless if the price were not economic. Cookers would not stand much of a maximum demand charge; in his area there was a cooker in every third house, but they needed to be considered with care as they would tend to create a peak of their own.

Thermal Storage Considerations

MR. W. N. C. CLINCH (Brighton) remarked that the authors should have used the word "approved" in their references to contractors. He pointed out that the Brighton gas concern had promoted Parliamentary measures to prevent the exclusion of gas from housing estates, and explained how estate agents had been induced to describe property as having "electricity supplied" rather than merely "electric lighting installed."

He had always been keen on off-peak load, but considered that thermal storage needed careful consideration, since cost in some cases made this subject difficult to pursue. But thermal storage could be applicable even in country districts; for example, boiling vats in a brewery were akin to thermal storage. He was distressed by the amount of rate relief permitted by the 1926 Act; it was a "sop" and a wrong policy to pursue. They should not segregate types of load, describing some as paying and others as not worth while; their endeavour should be to render "service" as a whole.

MR. E. A. LOGAN (Erith) thought the paper opportune as much more capital was now being invested in distribution than in generation, the ratio being two to one. In his area 82 per cent. of estate houses had electricity, but it was not so easy to get it into Corporation houses. In the last four years they had installed one cooker in every three houses and in that connection the services of contractors had been of very great value. Cooker hire cost was coming into prominence, and the wisdom of subsidising this branch of their business was beginning to be questioned.

An Example of Amalgamation

MR. F. W. PURSE (London and Home Counties J.E.A.) emphasised that some things were possible in large undertakings but not in small ones, and said the authors had skilfully "skated over several thorny points." He warned the meeting that proposed distribution legislation had not been shelved, but only held up by more pressing affairs. What had been done in his area was a preliminary to what legislation would do. Although a number of undertakings had been taken over, there were agreements which could not be changed, so in effect there remained four distribution areas which he had to try and run as one. It was a long-term problem and the I.M.E.A. was the best body to work out a solution when the matter was revived, as it would be in due course.

He considered that scales of charges had been too low; it was not wise to give away a good commodity. In future, costs would rise more quickly than revenue or profit and too-low prices did not permit of any "nest eggs" being accumulated for furthering extraneous development.

He described himself as an "unrepentant sinner" with regard to forced change-over from DC to AC; he had yet to see a balance sheet that would justify it on cost. No manufacturers would offer cheaper apparatus for standard voltage, and they would in any case have to produce non-standard types for export.

Slot Meters a Mistake?

MR. PRICE F. WHITE (Bangor) thought they had been too apt to sell electricity like a pound of tea instead of as a service, having regard for what such service would stand. He did not believe in flat rates, preferring two-part tariffs for everything except off-peak loads. It was a mistake to install slot meters for lighting and heating, since four times the consumption was obtainable on a two-part tariff. The 1926 Act needed to be amended to equalise bulk supply charges throughout the country.

MR. J. W. J. TOWNLEY (West Ham) asked for more enlightenment on the "suitable" arrangement made by the authors for inducing builders to install cooker wiring during the construction of houses. Small undertakings could not consider thermal storage heating, at bulk supply costs, so a three-part tariff would soon be required for off-peak loads which would not involve any additional standing charges.

MR. C. C. KIRBY (Alderley Edge and Wilmslow) confined himself to technical differences between large and small distribution systems, remarking that neutral balance was not obtainable and that surely it was not necessary to fuse the neutral side, in which respect a saving of a shilling per cut-out was possible.

Rising Coal Costs

MR. H. WEBBER (Keighley) argued that while falling profits were said to be due to selling too cheaply, they were really the result of the increasing cost of coal and the effect of maximum demand on the grid supply price. These, he contended, were the two stumbling blocks before the whole industry and he could not understand why the I.M.E.A. failed to act accordingly.

MR. A. G. COOPER (Thornton Cleveleys) differed from the authors' views regarding charging for services and earthing. Now that "composition" water supply pipes were being used they could not be relied on for earthing purposes.

MR. P. J. ROBINSON having read the paper in abstract, the reply to the discussion was undertaken by his joint author, Mr. E. L. Morland, who said it might be difficult to avoid writing another paper in reply. Their methods were such as to allow all classes of consumers to pay comfortably for what they could afford to use. It would need a clever fellow to hoodwink builders; the force of reasonable argument usually prevailed. For thermal storage heating, a little more than the cost of production would usually be satisfactory.

Municipal Finance

Paper Read by Councillor A. L. Boddington (Croydon) at Wednesday Morning's Session

MUNICIPAL electricity departments can suffer by not possessing independent chief accountants among their principal officers. In this paper Coun. A. Lester Boddington (chairman, Croydon Electricity Committee) commences by explaining how the extent of borough accountants' duties and responsibilities makes it impossible for them to acquire the intimate and exacting knowledge of electricity undertakings which will enable them to give the advice and guidance so often needed.

The result is that chief engineers have to spend much of their time in dealing with matters which are really outside their main duties of generation and/or distribution of electrical energy; so much so that commercial experience and ability to negotiate with the Central Electricity Board are now the first and primary qualifications, and technical knowledge tends to be secondary. The result is that the title of general manager is today more important than that of chief engineer.

Councillor A. Lester Boddington is chairman of the Croydon Electricity Committee

Another disadvantage is that Electricity Committees have to get the sanction or approval of the Finance Committee for expenditure on schemes which they consider necessary, but the Finance Committee may be more concerned with the size of the suggested expenditure than the necessities of electricity supply.

It is quite true that certain safeguards have been imposed by legislation, but necessity knows no law, and many and devious are the methods to which resort is made in order that the electricity department shall contribute more than its fair and legal quota to the rates, contributions which may materially handicap development.

Capital Charges

The paper then shows that monies received by electricity undertakings can only be expended in certain ways (as defined by the Acts of 1899 and 1926) some of the provisions being of great importance, since they govern the determination of the cost of production, particularly in respect of "selected" station owners' dealings with the Central Electricity Board.

The material point is what amount of the capital charges should be included in the costs of production. Prudence suggests that a station site, buildings and plant should be planned to allow for expansion; yet in arriving at the capital charges to be included in the production costs the C.E.B. has, up to now, only permitted those in respect of the actual land and buildings used in production at any given time, and hence the authority has to bear the remaining capital charges as part of its general expenses. This seems to the author to be a very short-sighted and cheeseparing policy which may well have the result of causing development to be slowed up when the need is greatest.

On the other hand the Board insists on charging hypotheticals on the basis of the plant which it thinks would have been installed whether it is in economic production or not, and thus is inconsistent in its outlook. If and when the Central Electricity Board directs extensions at selected stations it should recognise the need for progressive and long-term development and be prepared to pay its share of its provision, and not, as now, allow for short-term expansion except when it suits it.

Since very few, if any, undertakings can obtain adjusted station costs under Section 7, it is under the terms of Section 13 of the 1926 Act that one meets with charges on "hypothetical plant," which is the point on which most disagreements occur.

Loan Procedure

Many undertakings apply a portion of their surplus revenue in extensions of the service, instead of providing such facilities by means of loans. It is obviously impossible to charge any very heavy expenditure of this nature to the revenue of any one year, but it must, however, be realised that to charge *all* extensions and apparatus to loan account is not a very economical proceeding—particularly when the period for which the loan is sanctioned is a lengthy one, as when progress is rapid (and it has been very rapid in the industry since the conclusion of the Great War). This has the effect of a steadily increasing burden for loan charges, which is often not offset by increased earning capacity to the same degree, and thus tends to increase the cost of production. If extensions were made out of surplus revenue, no interest would have to be paid, or sinking fund allocations made, though for the purpose of arriving at the cost of production under Sections 7 and 13, interest could be charged on such expenditure.

Loans raised by local authorities are usually for general purposes, though at some later date the loans are appropriated for specific purposes. How often are allocations for electricity purposes made from those loans which carry the higher rates of interest? These allocations are made by the Finance Committees whose main concern is to keep the rates as low as possible, and hence appropriations recommended are not always made on a strictly equitable basis, nor is it considered what effect such higher interest charges will have on the costs of production and hence the economic effect on the undertaking which is run on a commercial basis.

"Technical Non-existence"

When the loans on improved plant have been repaid, and yet the plant having been brought up to date is still an effective and economic producing unit, the C.E.B. takes the attitude that such plant is no longer effective and needs replacement. This view of the technical non-existence of plant may, and does, cause the C.E.B. to hasten proposed extensions which result in increased capital charges, or alternatively result in its trying to charge for hypothetical plant when arriving at the price of energy under Section 13.

The Board does not hesitate to make use of such plant when occasion arises and its attitude to this question of modernisation is one which requires careful consideration by the supply industry, as undertakings are adversely affected by it, while at the same time it tends to discourage engineers from making improvements which would result in reduced capital expenditure and hence charges for loans in the costs of production.

How often do undertakings "hang on" to obsolete and inefficient plant and apparatus because it has not been completely paid for, so hindering the development of the undertaking and failing to get the benefit of reduced costs. This tendency will now be accentuated owing to the fact that costs are rising, and there is a keen and understandable desire not to increase charges unduly.

When a business is well established and development may be regarded as normal, it is, in the author's opinion, a wrong policy to extend loan periods, particularly in view of the fact that such rapid progress is being made in the design and efficiency of such apparatus as cookers, fires and other domestic apparatus. In the author's view it is the obsolescence of the apparatus which should decide the length of any loan period and not its possible life.

Town Hall Levies

Establishment charges constitute another means by which the general rate fund can be benefited by a "raid" on the resources of a successful undertaking. The Croydon undertaking contributes no less than £7,269 per annum for the services of the Town Hall staff, though practically all the work of the department is done by its own staff; but this year a suggestion was made that this sum should be increased by £10,000 in order to prevent the rates being increased by a penny. Such a method of levying a charge is not an equitable one, and once adopted creates a precedent which will be used against the undertaking on every possible occasion.

Some members of committees place their popularity with the public before their duty to a trading undertaking and the need of sound business methods. This is one of the great disadvantages of municipal control, and requires immediate rectification.

In the assessment of undertakings there arises still another method by which they may be called upon to pay more than they should to the general rate fund. Assessments must be watched closely as Valuation Committees do not, and cannot give any consideration to the effect which rising rates have on the cost of production of electrical energy. The formula used in arriving at the assessment is such that an efficient and progressive undertaking showing steadily increasing results is penalised by increased assessments, thus adding to the costs.

This is illogical, for factories are de-rated in order to give them facilities for cheap production.

A reserve fund invested outside the business merely ensures the ability to realise money quickly should necessity arise, but it brings but little benefit to that part of the supply industry controlled by municipalities, whereas if it were sunk in productive assets it would tend to reduce costs.

With lower capital charges due to the "digging-in" of profits the companies are placed in a more favourable position to produce and distribute electricity than the local authorities. May not this be one of the reasons why extensions of selected stations owned by companies are allowed to a greater extent than are additions to stations owned by local authorities?

The Rate Burden

Legislation wisely lays down a maximum of one and a half per cent. on the amount of the *outstanding* capital as the amount which can be allocated annually from the surplus to the relief of the rates of the authority owning the undertaking, but now that taxation is so heavy it is most essential that the position should be reviewed. The Croydon undertaking is contributing not less than £24,000 in relief of rates during the current year, or 2.4d. in the £ on the rateable value of the borough, but to obtain this sum the surplus must be at least 20/14.5×£24,000 or £33,103 9s., as from this figure income-tax amounting to £9,103 9s. has to be paid.

Thus the national revenue as well as the ratepayers receive material contributions at the expense of the consumer, but if charges were reduced to eliminate taxable surplus consumers would receive the full benefit, and not merely the net figure which they as ratepayers now get. It is argued by those who support rate relief that this is akin to dividends paid on the ordinary share capital of companies, but, as the ratepayers do not actually contribute any capital there is no reason why they should receive any benefit. The latest figures available show that 27.44 per cent. of the surplus of local authority undertakings is absorbed in gross interest, 45.33 per cent. in loan repayments and transfers to sinking funds, and 6.19 per cent. in net transfers to reserves and renewal funds, while 6.25 per cent. of the surplus goes in income tax and 2.46 per cent. in rate relief.

Another aspect is the cost per consumer of such relief. The Croydon undertaking has over 58,000 consumers and each thus contributes 8s. 3d. towards the rates. On small properties wired under the rental wiring schemes, and from which revenue is relatively small, this charge for rate relief is very heavy, and in effect means that such supply is actually given at a loss, and hence brings about inequality of charge.

The author concludes by seriously suggesting that the time has now arrived when the I.M.E.A. should urge upon the Electricity Commissioners and the Minister of Transport the need for legislation to ensure fair play to municipal electricity undertakings, and in particular to protect them from their owners, and thus ensure that proper business policy and development take place.

Discussion

Mr. J. W. J. TOWNLEY (West Ham) opened the discussion, speaking on behalf of Mr. P. J. Robinson, who had been recalled to Liverpool on urgent business. Mr. Robinson wished to explain that in the Liverpool undertaking one-sixth of the income was swallowed up in rate relief. Perhaps one day the stage would be reached at which no undertaking would contribute to rate relief because there would be no outstanding debts. Meanwhile rate relief would tend to settle down to logical proportions, because power station owners carrying out expansions would have to provide a reserve fund on swollen capital expenditure before contributing to rate relief, while non-power-station owners, having no generating expenditure, would have less outstanding debts on which to contribute rate relief.

He congratulated the author's undertaking on the high proportion of capital expenditure out of surplus revenue. The snowball effect of loan charges on certain classes of assets were becoming alarming and it was desirable that a proper proportion of capital expenditure should be made from revenue.

Continuing, Mr. Townley, speaking on his own behalf, suggested that this paper should have been read at a municipal treasurers' conference. Municipal accountants to-day knew far more about electrical finance than they used to do and only the elderly men failed at times to appreciate the requirements of electrical engineers. The possibility of an undertaking being transferred to another ownership suggested inquiries into what they would lose in rate relief. Power station owners could not, in any circumstances, derive any benefit whatever from the Act of 1926. This fact needed emphasising because bulk supply undertakings seemed to have an impression that power station owners were in a privileged position.

ALDERMAN CAPT. C. SAER (Fleetwood) stood up for that "villain" the ratepayer, whose credit had been relied upon when starting the undertakings and ever since consumers had derived benefit from the backing of the ratepayers' credit and undertakings continued to borrow money at a very low rate on that account. Therefore, ratepayers ought to receive some payment for the use of their credit.

ALDERMAN W. WALKER (Manchester) said it was pleasant to hear a speech so out-of-date as the last one. The question of rate relief was no longer a really live one. It was to the credit of undertakings that they should not deviate from the business of the electricity supply into side issues. Those which did so would fail in their duty; if they wished to make contributions to charity they should do so openly and not hide their contributions in various ways.

The author had pictured the Central Electricity Board as an octopus, seizing all and giving nothing in return. That was not a true picture by any means, as was proved by the many undertakings which were striving to become power station owners; this seemed contradictory and, as he pointed out, the Central Electricity Board could not be a profit-making entity. All profits must go back into the industry so that the Central Electricity Board was at the moment a trustee for the industry. At the beginning there were bound to be long discussions which diminished in time so that the relations between the Central Electricity Board and power station owners were much more understanding. The picture of constant wrangling which the author seemed to paint was not correct, and he did not think the author intended to imply any such thing. If local undertakings did their duty then there would be no room for company undertakings.

Co-operation with Treasurers

Mr. F. H. WHYSALL (Belfast) said he had consistently opposed rate relief and the best advice he could give was to refrain from appropriating profits for this purpose, but he would not go so far as the author's indictment of corporation officials. He had received great assistance from them and it was necessary to appreciate their point of view. The I.M.E.A. could do something constructive by meeting the Association of Borough Treasurers for discussing means of meeting the enormous demands which were made by successful trading undertakings for development expenditure.

Councillor J. L. REES (Pontardawe) disagreed with the author in his expression of a dangerous idea with regard to the final form of ownership. No finality had yet been reached. Reorganisation of the industry must take place before long; some sections would have to make concessions in order that consumers in rural areas could have cheaper electricity. The national ownership of electricity must also be thought about.

Councillor W. J. BENNETT (Thurrock) differed from the author's suggestion that municipal ownership was approaching finality and should be changed. He was very proud of local government operation, if only because it produced such men as the author. A joint electricity board was one of the worst kinds of things to contemplate, but in the long run it averaged out and was the best means of conducting operations on a large scale involving the incorporation of many undertakings and areas.

Councillor D. E. HAYES (Bexley) considered that the paper needed clarification in several respects; for example, with regard to "town hall charges," what measuring rod had the author used to determine whether this overhead charge was becoming excessive? The proper operation of a loan pool resulted in an average interest thereon which ensured that the electricity undertaking should not have to bear any higher interest than any other department of the corporation. Extension of loan period sometimes meant the possibility of reducing hire charges for apparatus. Therefore, it was justified when it was the only possible means of solving some problem, although it meant violating the canons of good finance.

The author, in reply to the discussion, said that several questions of considerable importance had been raised, to which he would reply fully in due course. Meanwhile, he would point out that ratepayers had long since been amply repaid for any credit they had extended; they could not expect to continue to reap such benefits indefinitely. The possession of a valuable asset should make it possible for lower rates of interest to be charged for loans than would otherwise be obtained.

Local authorities must eventually make provision for satisfying the needs of all consumers. Hitherto there had been too much restriction to geographical boundaries. He had not intended to suggest that change should not come about; some change would have to be made, but the form of it needed further discussion. The period over which a loan had to be repaid should not be allowed to fix or govern the hire charge of apparatus made available as a result of that loan.

Advertising Electricity

Paper Read by Mr. A. C. Cramb at Thursday Morning's Session

PEOPLE do not want electricity, as such, but they appreciate what it can do for them. Those uses which in the aggregate are of most importance to the industry are mainly those for which there are strenuously competitive alternatives.

Therefore, in this paper, Mr. A. C. Cramb (director of E.D.A.) emphasises that management is by no means purely administrative. He regards an electricity undertaking as a trading concern needing progressive and energetic control, so that the construction to be put upon the terms "advertising" and "selling" differs little from that applied to them in any other well-conducted business.

The public is so used to having its attention drawn in no uncertain manner to new things that, unless the proposition is brought to its notice, the existence of a commodity or service is not realised. Electricity, like everything else, has to be sold; the public must be told and shown what it will do and the best way of doing it.

There has been evidence in the last few years that emulation between undertakings to reduce prices has led in some cases to a tendency to ignore other aspects of service to consumers and a long-term policy based on sound commercial and financial considerations tends, in such cases, to be overlooked. The consumer will judge the value of the service received from the undertaking not only by the price paid for energy, but also by the help and advice given and the maintenance of installation and apparatus.

Scope for Increased Use

The growth in domestic consumers, which has been striking, cannot continue indefinitely; in fact, it is already approaching temporary saturation in many towns where much of the unwired property is of the type likely to be demolished in a few years' time due to slum clearance, street widening or other improvement schemes. The scope for increased consumption lies, therefore, in greater use by existing consumers. The probable expansion due to this cause is of much greater magnitude than the increased business so far obtained from the connection of new consumers.

This different trend of business, or load building, involves the installation of appliances rather than the extension of mains and necessitates more advertising and selling.

The two most important domestic load builders are cookers and water heaters. Over a million and a quarter cookers are in use and their design has so advanced that more attention should be given to their hire-purchase, provided always that free installation and maintenance are included.

In industrial areas it will probably be necessary to continue the simple hire of electric cookers for the benefit of those weekly wage earners whose sense of security is insufficient to enable them to undertake the responsibility of purchasing the cooker over a long period of years. It would be of considerable assistance if arrangements were made generally for hire-purchase agreements to be transferred from one supply authority to another.

A curve showing the rate at which electric cookers have been connected to the mains in recent years may be reasonably extended to indicate 2,740,000 as the potential number of cookers in use at the end of 1943. The rate of increase in the number of water heaters installed has been greater than that of any other appliance although the total number in use is less than the number of cookers.

Cooking and water heating are increasing more rapidly than other domestic uses. The apparent fall in the consumption of fires and other appliances during the last two years is no doubt due to *average* winter temperatures having been higher than usual.

Industrial Power Sales

The scope for industrial electric heating has been estimated to be at least as great as that for electric power. Increased sales staffs are, however, very necessary to ensure that industrial consumers shall obtain proper advice with regard to the part which electricity can play in improving the manufacturing resources of the country.

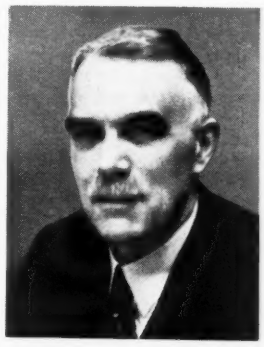
There is great scope for the increased use of electricity in public buildings, institutions, hospitals, schools, offices, hotels and shops. The use of electricity for space heating is now well past the experimental stage particularly for buildings which are only occupied intermittently or for a relatively short period in the 24 hours, but it would be a mistake to assume that electricity can replace more than a small amount of all the fuel-fired central heating installations in the country, the reason being the limited off-peak load capacity of the power stations and distribution systems.

This additional load can be obtained, however, only if the electrical industry puts at the disposal of building owners, architects and others, the services of competent sales engineers who can give advice on the most economical and effective methods of application.

There is also considerable scope for cooking in commercial premises, e.g. for canteens, hotels, restaurants, clubs, schools, institutions and hospitals.

Organisation for Advertising

The amount of money which can profitably be spent on sales organisation and service work has not received the attention it deserves. The amount to be spent on salaries and expenses for the whole of the sales department should be at least 2 per cent. of the total revenue and might be with justification as much as 5 per cent. where sales expenses are higher, such as in new or rural areas.



Mr. A. C. Cramb, M.I.E.E., is Director and Secretary of British Electrical Development Association

The commercial side should be planned as a coherent whole and not as a collection of sections or offshoots from other departments with divided responsibilities. A scheme of organisation which is suggested as a suitable basis is outlined in the paper, in which the senior sales staff members are described as sales engineers, the reason being that experience has shown that the more responsible commercial work can best be carried out by those who have had some engineering training, but this does not mean that their sales and commercial ability should be any the less in consequence.

The type of man who has a combination of engineering knowledge and commercial ability is not too common, and, it must be admitted, has not been attracted by the remuneration generally attached to such positions in the supply industry. It is evident, however, that as the scope increases for engineering work in connection with the utilisation of electricity as distinct from its generation and distribution, the handicap of inadequate remuneration will have to be removed.

Training Sales Staffs

With regard to the rank and file of the selling organisation it has been evident for some time that there is in many undertakings a serious lack of man power. The employment of more sales representatives is a prime necessity in the expansion of the consumers' service side of a supply undertaking, and it is a fallacy to assume that if consumers require advice they will of their own accord call at the showrooms. The training of a sales staff has always been a matter which it has been thought a national organisation could effectively promote and assist.

So far over 1,600 students have taken the E.D.A. training course, but this number would be greatly increased if some assistance towards payment of fees were more generally given by those in control of supply undertakings.

Generally, the best case for a central showroom from the supply authority's point of view is to be found in the fact that superior staff resources are available and this enables the service to be more comprehensive and more efficient, particularly in dealing with technical detail. In towns where geographically there is but one main centre and that is reasonably accessible to the population, a case can be made for one large showroom. But in most towns experience reveals a need for local or subshowrooms if the cardinal principle of "reasonable accessibility" is to be met. Above all other considerations— and this is where tradition and technique come in—an electricity showroom must be functional, not only in its ability to demonstrate electrical appliances, but of equal importance, functional in matters of constructional detail.

While the general trades exhibition, and its prototype under various titles, is looked upon sometimes with some suspicion, the purely local electrical exhibition has proved itself to be

a valuable contributor to electrical development. A case for a biennial or triennial exhibition can well be established in every area where consumer saturation is less than 70 per cent., or cooker and water heater saturation less than 20 per cent. Local electrical exhibitions have proved to be definite attractions, as figures of attendance show; for example Sunderland's eight-day exhibition attracted 78,000 visitors, Swansea 39,000, Southend 25,000, and so on.

Without making any undue claim for the influence of an exhibition on load building, the experience of many managements is that a well-planned and well-publicised exhibition gives immediate acceleration and continues to produce a steadily rising curve for a considerable time afterwards. In several instances the accompaniment of an exhibition to the launching of a new tariff, or a new trading policy, has provided a solid foundation for business development such as could not have been secured in any other way.

The British Electrical Development Association has spent during the last five years alone over £200,000 on Press advertising. As this benefits the whole of the industry, it is unfortunate that a few supply authorities still refrain from contributing their due subscription. The amount of advertising appearing in all the Press—local and national—is at present very far short of amounts spent by other industries. In this connection it may be remarked that many of the domestic uses of electricity can contribute intrinsically to the health and comfort of the public as much, if not more, than some of the commodities which are more widely advertised.

One per Cent. Minimum

To cater effectively for the public demand for electric service, the management of most undertakings need for such advertising and publicity work, not less than 1 per cent. of their revenue. A number of undertakings are already operating in accordance with the 1 per cent. scale and the adoption of this principle generally, subject, of course, to local considerations, would realise £900,000 annually. This sum is not at all large in comparison with the prospective increased sale of electricity. For example, the difference between the present 419 kWh per annum per head of population, and the figure of 1,000 kWh per head which may reasonably be expected in the future, is no less than 26,000 million kWh. This, at an average price of 1d., means an increase of over £100,000,000 in revenue.

It has always been recognised in connection with the simple hire of electrical appliances that the supply authority is bound to be responsible for maintenance work. Such service work has been so much appreciated that some supply authorities have given serious consideration to the question of providing a maintenance service for rectifying faults in wiring installations and small defects in appliances which are the consumers' own property. The main objects of such schemes are to ensure that wiring installations are kept in a safe condition and that appliances are not out of commission due to minor defects. There is, however, the additional advantage that the provision of extra lighting points or plugs which would increase the convenience of the installation in every-day use is brought to the notice of the consumer in a way which will ensure that the work will be properly carried out. Moreover, experience shows that a service of this kind promotes good public relations and affords an opportunity of making sure that every consumer obtains the fullest satisfaction from the electric service in his house.

Example Inspection Services

One of the first schemes for giving a free inspection service was inaugurated at Sunderland some three years ago and includes inspection of the service point, meter, wiring installation and flexible cords entering lampholders and appliances. Minor repairs are made free of cost, and the consumer's order is obtained for the repair of serious defects. The service men are provided with uniforms, bicycles and suitable tools. Each man makes an average of 50 calls per day and consumers are visited approximately three times a year. Reply-paid postcards are left with consumers to enable them to report faults which occur in between regular visits. The cost of this service is approximately 1s. 8d. per consumer per annum and there seems to be no doubt that the expenditure is found to be well justified.

In other undertakings annual test schemes have been organised, a small fee such as 2s. 6d. being charged, payable at the end of the quarter during which the installation is tested. The test and the examination are carried out at the convenience of the consumer but preferably during the summer months, which helps to keep the wiring department constantly employed. Another method is an insurance scheme by which a supply authority agrees to maintain appliances, such as cookers, water heaters, etc., belonging to consumers, for a fixed sum such as 10s. per cooker per annum, which includes the replacement of defective parts.

There is scope for discussion as to the best lines on which such service facilities should be organised.

Mr. Cramb's paper concludes with a brief outline of the organisation and work of E.D.A.

Air-raid Precautions

Paper Read by Mr. J. M. Kennedy at Thursday Afternoon's Session

IN this paper dealing with air-raid precautions in relation to electricity supply undertakings, the author points out that each undertaking is expected to carry out at its own expense what are known as the "Good Employers' Obligations," defined in the appendix to a circular letter of August 3rd, 1938, as:

(*a*) To train members of their staff in the various air-raid precautions services (first-aid parties, fire parties, decontamination squads, etc.), and other essential services.
(*b*) To do all the necessary work in the preparation of a scheme of precautions.
(*c*) To make arrangements for the conveyance of air-raid warning messages within their premises and for any emergency system of communication.
(*d*) To augment existing fire fighting arrangements and to organise first-aid and cleansing services, fire parties (where necessary) and decontamination squads, and to provide the necessary accommodation, equipment and materials.
(*e*) To provide material to render premises dark by night and to undertake any necessary camouflage painting.
(*f*) To provide such refuges for their workpeople and such protection as is reasonable and necessary for plant and materials, also stocks of ordinary spare parts.

As it has been assumed in some quarters that the Civil Defence Bill relieves public utility undertakings of some or all of these obligations, or sanctions some grant towards the cost involved, Mr. Kennedy proceeds to summarise the provisions of this Bill as it was amended by the Committee in the House of Commons immediately before Whitsun.

For example, Clause 29, in Part IV, enables the Commissioners to make regulations as to the design and construction of new buildings and for the extension of old buildings, to make them less vulnerable to air raids. These regulations may also relate to the provision of air-raid shelters.

In Part V, Clause 32 provides that every undertaker shall report on the training of personnel. In addition, the Commissioners may require reports on proposals for shelters and on the measures to be taken for the due functioning of an undertaking in the event of hostile attack. Under Clause 33, the Commissioners may serve a notice on any undertaking requiring it to carry out the works which are referred to in the preceding clause.

Mr. J. M. Kennedy is deputy-chairman of the Electricity Commission

Clause 34 deals with the only grant to be given in connection with such works, namely, in respect of air-raid shelters, which is to be an amount in the pound, equal to the standard rate of income tax for 1939-40, limited to some approved rate of expenditure per head of personnel for whom the shelter is provided.

Under Clause 39, all public utility undertakings have to take steps to prevent any lights used in their buildings from being seen outside; where it is essential to have external lighting, adequate shading and reduction of intensity are stipulated, combined with arrangements for immediate extinction. Clause 41 deals with camouflage and may be of particular importance to those undertakers who possess large concrete cooling towers. An experiment has already been made on one such tower, and the whole question is now under consideration. Clause 42 indicates that a 50 per cent. grant will be made towards the cost of camouflage, but not for obscuring lighting.

The foregoing clauses comprise "Good Employers' Obligations," but a written answer given by the Chancellor of the Exchequer on March 18th, 1938, indicated the extent to which expenditure on A.R.P. may be admissible as a deduction in computing profits for income tax assessments.

Clause 38 authorises the provision of the "national reserve" by the Central Electricity Board, and indicates that a 50 per cent. grant will be available towards the capital cost of these works. The clause also refers to a 50 per cent. grant towards "approved expenses" of other electricity undertakers in "taking measures for securing the due functioning of their undertaking," and it is in relation to this provision that there appears to have been some misconception. In sub-section (2) the expression "approved expenses" means such expenses of a capital nature incurred on such measures as the Electricity Commissioners, acting in accordance with the general directions of the Treasury, may approve for the purposes of this sub-section.

Although the Treasury has not yet issued officially these "general directions," it has made it clear that the 50 per cent. grant towards the "national reserve" and to the special works to which this sub-section is applicable is contingent upon the industry carrying out *at its own cost* the "Good Employers' Obligations."

The only other important part of the Bill in relation to electricity is the first schedule, which defines in Part I the financial arrangements to be made by the Board as regards income and expenditure, and by the Commissioners as regards a levy on the industry (on the same basis as the levy for standardisation of frequency) to meet the annual charges on that portion of the expenditure which is not covered by the 50 per cent. grant and any other revenue expenses. Part II deals with the liquidation of the fund, and Part III, in effect, makes each undertaking bear the burden of its own "Good Employers' Obligations" and its contribution to the levy for the "national reserve."

Training of Personnel

Training of staff in routine or special duties needs little explanation, except as regards the extent to which preparation need be made for the decontamination of mains preparatory to repairs being carried out. Gas bombs alone will probably not damage underground cables; should the unexpected happen, and a gas bomb be dropped in the same place as the high explosive, it will primarily be the duty of the local authority to decontaminate the area as a whole, and only in the case of a very vital supply cable should it be necessary for the electricity supply authority to carry out repair work in a contaminated atmosphere.

It should be made clear to all outside staff that when an air-raid warning is given they must take cover as quickly and effectively as possible; unless the raid is of long duration, only after the "all-clear" signal has been heard should any attempt be made to get in touch with their headquarters to ascertain what action is required.

It is desirable to provide special shelters for the few key men who must remain at their posts in generating stations and a few important sub-stations or switching centres. The rest of the personnel should preferably be provided with shelters outside the building.

The bricking-up of windows appears to be preferable to the use of sandbags for the protection of machines against splinters, but the wall of a neighbouring building, if within 50 ft. of the windows and of suitable height, may be sufficient protection.

Claims for Grants

Special works which may rank for grant are important transformers in exposed positions needing a protective wall for A.R.P. purposes alone; a few very important cases in which it seems desirable to replace the roof over very vital switchgear or control panels with a reinforced concrete roof; and interconnection between neighbouring undertakings if of no peacetime value. A committee representative of the whole industry has been set up to assist the Commissioners in deciding what works should rank for grant, and all claims will be submitted to this committee.

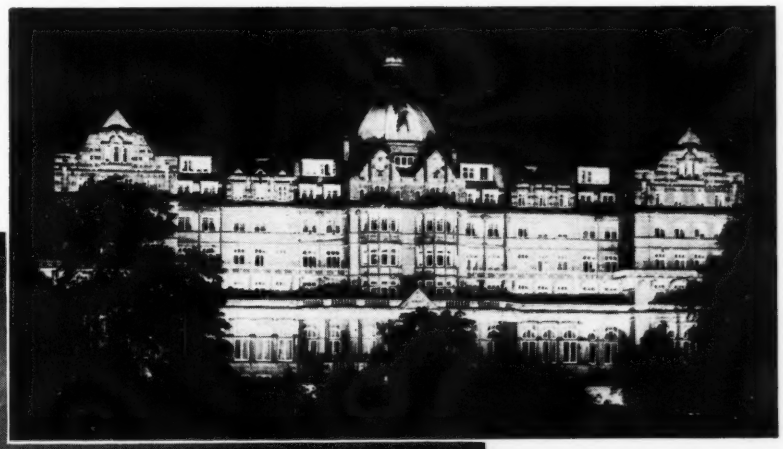
Replacement of generating plant would take many months, whereas the installation of spare transformers and switchgear can be effected with little delay. Hence the decision to provide a national reserve of transformers and switchgear. This question has already been taken up with some 260 undertakings, over 200 of which have reported upon the extent to which they might have to draw upon the pool in different emergencies, and have indicated that sites are likely to be available should an emergency arise.

The delay in resuming supplies due to the time taken in jointing cables could be much reduced by the use of a cold jointing compound.

All the capital cost incidental to the national reserve scheme (other than such expenses to which an undertaker may be put in assisting erection with his own labour and material) are to be pooled, one-half of the capital cost up to £3,000,000 being borne by the Treasury, and the other half by the industry.

In conclusion, Mr. Kennedy urges all undertakings who have not yet done so—and there are over 200 of them—to prepare and submit their A.R.P. schemes as quickly as possible.

The picture on the right shows the Majestic Hotel, Harrogate, headquarters of the I.M.E.A. Convention, as floodlighted with B.T.H. equipment. Altogether eighty-five projectors, representing a load of 60kW, are used for the facade and the hotel surroundings



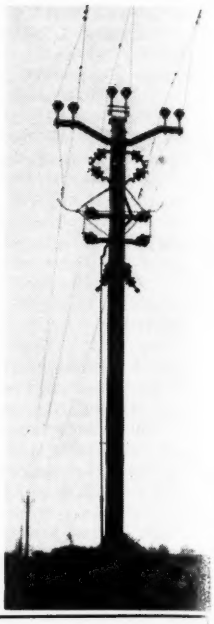
Siemens floodlighting projectors are employed in the illumination of the Royal Hall Gardens (left), a combination of tungsten and mercury-vapour lamps producing an excellent effect. The company was also responsible for the floodlighting of the Grand Hotel

RURAL DISTRIBUTION

A Description of the Harrogate System

By N. McLean, A.M.I.E.E.

In last week's issue of the "Electrical Review" we touched briefly on the rural distribution at Harrogate. This article by Mr. McLean, the borough electrical engineer and manager, describes the system in greater detail



Switch-fuse on single line pole in York Road, Knaresborough.

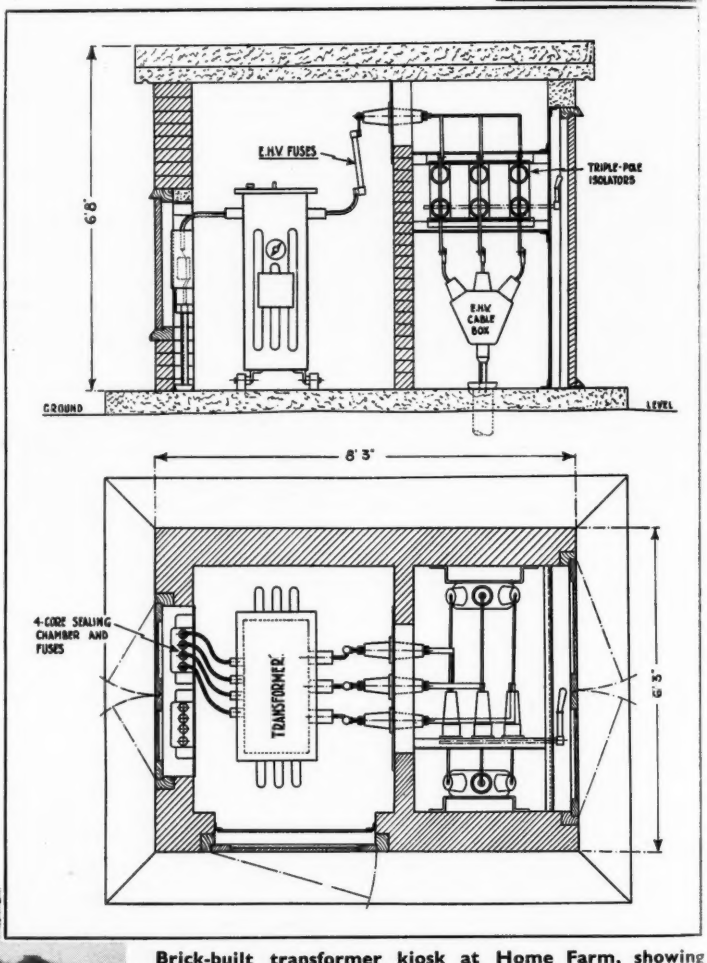
THE rural district of the Harrogate supply area, although covering a large area, is in most parts very sparsely populated, and before the main overhead line system was erected careful thought had to be exercised so that the lines would be in the most suitable position for supplying the majority of the possible consumers. While the demands for supplies received from farms and hamlets near the lines proved very satisfactory, there was still a large number of premises which would have welcomed a supply of electricity if low terms could have been quoted. To assist the expansion of the supply, the question of reducing the cost of providing electricity to such places as these was reviewed and it was decided that the use of a small 11-kV underground cable in place of the usual overhead line would, in some cases, help considerably. The actual type of cable decided upon was 1/0.144 in. (No. 9 s.w.g.), 3-core, p.i.l.c. d.s.t.a.

Mr. Neil McLean, borough electrical engineer and manager of Harrogate.

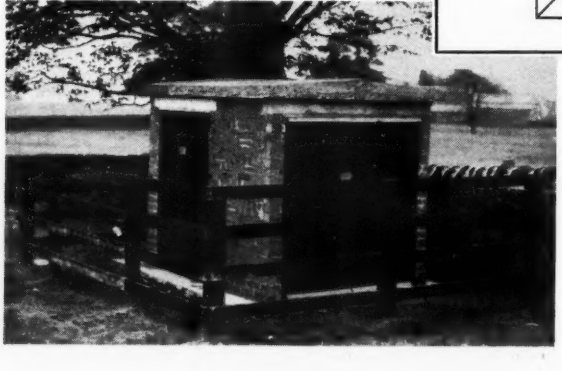
Under the system of connection adopted a hand-operated, air-break, switch-fuse is mounted on the line pole, and the cable runs from the switch-fuse to an outdoor type transformer mounted on a concrete bed fixed at ground level situated near to where the supply is required. The cable is run direct to the transformer terminals and no fuses or isolators are employed. For the l.v. side a steel housing is fitted direct on to the transformer tank, and enclosed in this are h.r.c. cartridge fuses. The service cable is connected to the fuses and the other end terminates in the consumer's premises. The e.h.v. cable is laid direct at depths varying from 2 ft. 6 in. to 3 ft., and is protected by means of earthenware tiles.

Wayleave difficulties are greatly reduced when underground cables are used, as well as the necessary time and cost. Farmers especially appreciate the use of underground cable in place of overhead line where the route crosses meadow and arable land, while a further advantage gained by using underground cable is that the route length of the service can often be considerably shortened.

At first thought the connection of a transformer direct to the cable may appear to be unsound policy, but the contention is that the transformer can be considered to be as reliable as the cable and experience has proved this to be justified. In the case of spur lines which will eventually develop and form a "ring" main, it is desirable that tappings should be so designed that it is possible to break the "ring" and to be able to completely isolate the particular transforming point.



Brick-built transformer kiosk at Home Farm, showing sectional elevation and plan



In these positions a brick-built kiosk, approximately 8 ft 3 in. by 6 ft. 3 in. by 6 ft. 8 in. high, with a flat concrete roof, is erected. A brick wall divides the building into two compartments, one for the transformer and the e.h.v. fuses and the other for the isolators. The incoming e.h.v. cable ter-

minates in a trifurcating box mounted on one wall of the isolator chamber, while the outgoing cable runs from a similar box mounted on the opposite wall. Detachable copper links connect the bus-bars to the incoming and outgoing cables. Connected between the bus-bars and the transformer is a 3-pole, ganged, air-break, hand-operated set of isolators, and three tetrachloride h.r.c. fuses. The fuses are mounted in the transformer chamber and are conveniently accessible. The whole of the e.h.v. section is effectively safeguarded by means of sheet steel screens. The l.v. supply from the transformer runs to a sealing chamber provided with cartridge fuses, and accessible from outside. From this point runs the service cable.

Another form of tapping e.h.v. cable is carried out by means of ironclad, outdoor type units consisting of ring-main isolating units coupled directly to one or more oil switch-fuses (fig. 5). Complete isolation of the "tee off" can be obtained, and the switch-fuse protects and switches the spur line feeding a transformer. At Harrogate all e.h.v. and l.v. end boxes on transformers up to 150 kVA are provided with the same standard fixing centres. This feature is extremely useful when it is necessary to change a transformer to a larger size. Also, in the case of breakdowns, where time is an important factor, it is unnecessary to remake the end boxes.

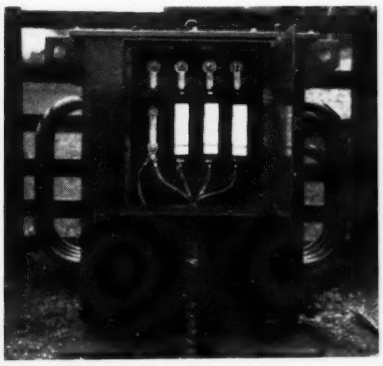
In the borough the h.v. mains system originally consisted of 2,000-V, single-phase feeders, separate trunk mains being laid from the power station to sub-stations situated where the supply demand was greatest. In 1929, when a three-phase system was decided upon and an 11-kV ring main was laid and new sub-stations were built, it became neecssary to decide just how these existing 2,000-V single-phase feeders could be utilised to best advantage.

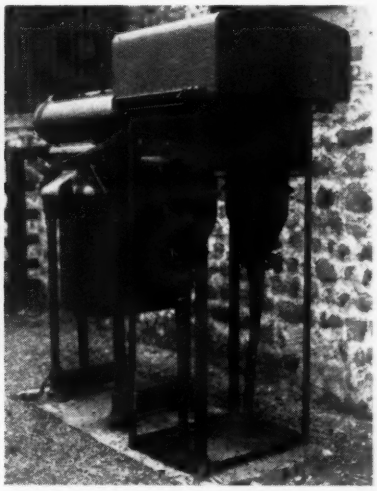
The switching and transforming points are either brick built sub-stations or steel kiosks.

The rural area is supplied at the national standard pressure, whereas the greater part of the borough is supplied at 200 V and the Electricity Department has therefore to consider the question of future change-over before transformers, switchgear, &c., are purchased. For example, a large l.v. switchboard recently ordered for a sub-station in the centre of the town is provided with duplicate bus-bars and change-over switches arranged to supply all outgoing distributors on either 200/346-V or 230/400-V; when the change-over is completed the board will be used as a standard double bus-bar unit. Similarly all transformers recently purchased have dual tappings on the l.v. side. New consumers, too, are supplied at the standard pressure whenever possible, and in the centre of the town the l.v. network is arranged to give duplicate supplies in most of the streets, while the inclusion of many disconnecting boxes makes it practicable to sectionalise the mains and so facilitate change-over work.

Recently 7-core pilot cables have been laid with all e.h.v. mains of 0.1 sq. in. or larger for operating "Translay" protective gear and for telephone and alarm signals. Where pilot cables are not available, overload and earth leakage relays (both directional and non-directional), together with interlocking relays, are used. The majority of faults on overhead lines in rural areas are of a transient nature, and by installing motor-operated auto-reclose switches with overload and earth fault relays the period of interruption has been minimised. Surge absorbers and "Thyrite" type lightning arrestors have very considerably reduced interruptions due to lightning.

The undertaking has a well equipped meter testing station, capable of handling 6,000 ordinary and 4,000 prepayment meters per annum. A labour-saving method is employed in the form of small trolleys, each having three shelves and being capable of carrying up to 36 meters (*i.e.*, a sufficient number for one test board). When new meters come into stock they are loaded directly on to the trolleys and are then in their turn taken alongside the test board. After testing, the meters are replaced on the trolley and they remain in this position until "certified" by the meter examiner.





Left: An outdoor type transformer at Mickley showing e.h.v. and l.v. boxes. Above: L.v. dividing box at North Stainley with cartridge fuses. Right: Ring main unit and switch-fuse at North Stainley

Although there are no local industries, the town possesses a large number of hotels with a considerable load, and it was therefore decided that these should retain their 2,000-V supplies and thus lighten, to some extent, the load on the new three-phase mains. Also, these single-phase feeders supply transformers in roadside pillars, and in turn a certain proportion of the single-phase l.v. network. In the new sub-stations, switchgear was provided for controlling the 2,000-V network and, while the gear had three-phase bus-bars, it was designed so that single-phase feeders could be connected in such a way that the load was balanced to a reasonable degree over the three phases.

As mentioned in the ELECTRICAL REVIEW last week, the distribution staff has been reorganised to deal quickly and effectively with any breakdown on the e.h.v. or l.v. overhead and underground systems and also as a precaution in war-time.

High-Tension Conference

A MEETING of the Conference Internationale des Grands Reseaux Electriques, also known as the High-Tension Conference, is to be held from June 29th until July 8th. About 120 papers are to be presented (14 by British authors) mainly on transmission and associated matters, but none of the meetings will be held simultaneously. Visits will be paid to places of outstanding technical interest, such as the St. Denis and Arrhigi power stations, the S.S. *Normandie*, the Paris-Le Mans electrified railways and the Erguzon hydro-electric station.

After the conclusion of the conference trips will be arranged to engineering centres of various parts of France and Switzerland. Messrs. P. V. Hunter and E. B. Wedmore, as chairman and vice-chairman of the British National Committee, with Mr. R. A. McMahon as its secretary, are in charge of arrangements in this country.

The contributions to the Conference by British electrical engineers include the following: T. R. Scott on "The Employment of Styrolene Impregnated Etherified Insulation in Electrical Construction"; A. M. Cassie on "A New Theory regarding Arc Rupture and the Severity of the Circuit"; H. Trencham on "The Problem of the Principal Busbars of Central Stations"; C. Beaver and E. L. Davey on "Progress with Gas-filled Cables"; P. V. Hunter, P. Dunsheath and L. C. Brazier on "Conditions to be met in Gas-filled Cable Manufacture"; J. W. Preston on "Armoured Conductors for Overhead Transmission Lines"; H. W. Grimmitt and H. W. Taylor on "Tendencies in the Study of Wooden Supporting Masts"; A. E. W. Austin and H. G. Taylor on "The Measure of the Earth Resistance of Masts without disconnecting the Earth Wire"; C. W. Marshall and J. S. Forrest on "New Tests of Anti-fog Insulators of the British Grid"; T. E. Allibone on "The Insulator Committee's Work since 1937"; K. J. R. Wilkinson on "The Repeating Method in the Study of Excess Tension Phenomena"; F. S. Edwards on "Recent Developments in Wave Generation Research"; E. B. Wedmore on "The Excess Tension Committee's Work since 1937"; and R. Davis and H. M. Lacey on "The Progress of Research Work on Excess Tensions."

SUPPLY STAFFS' SALARIES

Position of Sales and Consumers' Engineers

By W. Arthur Jones, A.M.I.E.E.

FOR many years the Electrical Power Engineers' Association has urged the necessity of including in the Schedule of the National Joint Board a standard scheme of grading for all members of the technical staffs of electricity supply undertakings. The demand for such a scheme has not been confined to members of the E.P.E.A., but from time to time has been supported by many chief engineers.

The author puts forward the claim of sales and consumers' engineers for the regularisation of their positions and improvement of their salaries and status. A scheme evolved by the E.P.E.A. is outlined.

It was in pursuit of such an objective that the Association in 1930 included in its proposals for a revision of the National Joint Board Schedule, a standard scheme of some 95 designated and defined grades. This scheme was not acceptable to the employers' side of the Board, who, apparently, were astounded at a scheme which comprised so many designations. The fact that so large a scheme was essential indicated not only the growth and development of the industry but was a somewhat significant comment on the diverse conditions then obtaining and which have been added to rather than otherwise.

The growth and development of the industry has continued since that time, and especially has this been so in the case of the sales and development section. The need for some standard scheme of grading has, therefore, been accentuated, and the E.P.E.A., being unable to secure the negotiation of a complete Schedule, has come to a decision to deal with the problem in sections.

One of these sections is that of sales and consumers' engineers. During the past three years a committee, nationally representative and consisting of sales and consumers' engineers actively engaged as such, has made a thorough investigation into the grades and salaries of engineers employed in this department of the industry.

After careful consideration the report of this committee has been adopted by the National Executive Council of the E.P.E.A., so that it can now be said that these proposals are, in the view of the Association, the "trade union rates of pay" for this class of employee. The proposals have also been submitted to the National Joint Board and, at the moment, are the subject of negotiation by that body.

Space will not permit extensive quotations from this report, which was published in the April *Electrical Power Engineer*—interested parties can obtain a copy from the E.P.E.A. —but the basic proposals may be mentioned.

Trained Engineers Essential

The fundamental principle is, that for the proper and efficient operation of a sales and consumers' department it is essential that the majority of its staff should be trained engineers with commercial ability and experience, and with regard to those assistants where commercial ability is the main necessity, technical training is also a desirable factor. It is in pursuit of this objective that the E.P.E.A. has provided special educational facilities by including in its correspondence tuition scheme a special course for sales and consumers' engineers.

In this course, and in addition to the necessary technical instruction, including such subjects as power factor and methods of improvement, load factor and diversity factor and their influence on costs, particular attention is given to such questions as contracts, heating, illumination, comparative costs, installations and their specifications, electricity legislation, publicity, and the theory and technique of salesmanship.

The necessity for such training and knowledge is emphasised by the duties and responsibilities attaching to the sales engineer as head of his department. These may be enumerated as follows :—

(1) Organisation and control of showrooms (these showrooms will be mainly devoted to domestic applications, but may also include an industrial demonstration room).

(2) Sale, hire-purchase or hire of such domestic appliances as water-heaters, which require technical knowledge during some part of the sales negotiation.

(3) Sale of energy (and/or appliances) needed in commercial and industrial premises in connection with power and heating processes. In most of these applications there is keen competition from public services and private interests, *e.g.*, gas, hydraulic supply, coal, coke and oil, and a high degree of technical skill and experience is needed in order to ensure satisfactory development.

(4) Lighting service, in connection with the use and sale of electricity in domestic, commercial and industrial illumination.

(5) Publicity, which may comprise :—(*a*) Window and showroom display; (*b*) press advertising and preparation of leaflets; (*c*) organisation of lectures, demonstrations, exhibitions, show houses, etc.; (*d*) co-operation with E.D.A. committees, etc.

(6) Formulation of tariffs and conditions of sale.

(7) Installation, testing and maintenance of consumers' appliances, especially those which are in use under hire-purchase and hire schemes.

(8) Administrative and clerical work connected with consumers' applications, consumers' records, routine instructions to other sections, and liaison between mains, motor and substations sections.

(9) Electrical installations, *i.e.*, specifications, estimates, supervision of direct and/or indirect labour.

It is evident that for the efficient performance of these duties not only must the departmental head be a trained technical engineer but the majority of his staff, save perhaps some junior showroom assistants, should likewise be trained engineers.

Fair Remuneration Demanded

Such a staff naturally desires and expects a fair and reasonable remuneration, but this condition does not exist at the moment. Here and there the salary may be said to be commensurate with the importance of the work, but in a large number of cases the salary is more akin to the feeble and tentative manner in which the particular undertaking runs its sales department.

Mr. W. A. Jones is general secretary of the Electrical Power Engineers' Association

From the very timid efforts of the past, has grown the organisation which we see to-day and a general and better realisation not only of the value of sales talks but also of the technical characteristics of the majority of problems dealt with by the sales department, and the necessity for properly trained technical engineers to deal with such problems if the desired sales are to be secured by the undertakings.

There is still in some undertakings, both municipal and company, much of the old idea that all that is required to sell electricity to the varied types of consumers is a man trained in salesmanship only. The E.P.E.A. does not in any way deprecate the value of training in salesmanship : on the contrary, it strongly supports it. At the same time it is of the opinion that, whilst the ordinary domestic appliances which normally are handled in a showroom can in many instances be dealt with by commercial staffs, when other sales problems arise such as those connected with lighting, water heating and all forms of power and heating, and the preparation of electrical power schemes for various industrial processes, then the trained engineer is essential. These views are confirmed by the McGowan Committee which in its report observes :—

> "There can be no question that to secure a substantial demand for electricity it is essential that all undertakings should adopt a progressive sales and development policy, and that for such a policy to be effective the undertaking must employ expert and well-paid technical and commercial staffs."

It is on this basis that the Association has formulated its proposals and has endeavoured to set up a scheme of staffing of sales and consumers' departments which will be applicable to all types of undertakings. It is appreciated, however, that in some of the larger undertakings, especially in the case of power companies, the system of organisation may, because of

APPLIANCE PROBLEMS

Co-operation Between Manufacturers and Supply Authorities

By S. C. Hurry

IF the objective of the supply authority differed from that of the manufacturer, the relationship between them would be relatively unimportant. But, although the approach is from different angles, both aim at the same goal, *i.e.*, the popularising of electrical appliances, and, for this reason, the degree or quality of their co-operation becomes of moment.

That co-operation does exist none will deny, but the spirit in which it is offered on the one hand, and the atmosphere in which it is received on the other, frequently leaves much to be desired.

It must, of course, be remembered that those two branches of the electrical industry operate under totally different conditions. Broadly speaking, supply authorities are not competing one with another. It is, however, axiomatic that manufacturers of electrical appliances are inevitably in constant competition for the favours of the public.

Supply authorities have their own ideas on the design of apparatus, a fact which sometimes hinders progress. This is an appeal for closer relationships with manufacturers who, after all, have studied their subject very closely but are still willing to learn.

So far as the smaller appliances are concerned, this is, of course, largely the affair of the manufacturers themselves. But an entirely different set of conditions arises when dealing with larger types of apparatus. Here, because the capital expenditure involved is necessarily higher, the main outlet for such products is through simple hire or hire-purchase schemes, and manufacturers must, therefore, compete for public support through the medium of the supply authorities themselves. Hence, co-operation between manufacturers on the one hand and the supply industry on the other, becomes of primary importance.

[*Elliott & Fry*

Mr. S. C. Hurry is sales manager of the Jackson Electric Stove Co. Ltd.

Co-operation means union for the same end, but the effectiveness of a union is enhanced or diminished according to the desire of the partners to understand one another's difficulties, and by the degree of the resolve to meet and overcome them. Broadly speaking, it can be said that manufacturers have a very fair appreciation, so far as their wares are concerned, of the difficulties confronting supply authorities who offer these products to the public. It is, however, doubtful whether the manufacturers' problems are seriously considered, even if they are thought of, and it is certain that their efforts are frequently unrewarded

Let us see what justification exists for this expression of opinion. In order to examine it, let us confine our attention to the electric cooker, because this is the best revenue-producing piece of apparatus in the field of domestic electricity, and because the scope for development in this direction has such enormous possibilities.

Every cooker manufacturer realises that the connection of another cooker to the supply mains means an addition to the potential calls upon the department whose business it is to deal with service to consumers. He knows that, sooner or later, it will have to be "serviced"; he appreciates to the full the onerous nature of the maintenance problem; and he visualises the fact that at some time or other it will probably have to be completely reconditioned. These, of course, are but a few of the burdens which a cooker lays upon the shoulders of the supply undertaking.

What contribution does the manufacturer make towards their easement, and to what extent is he supported in his laudable ambition?

In order that the life of the cooker shall be long, and the cost of its maintenance low, the manufacturer favours the most robust form of construction. The supply authority, while admitting the desirability of long life and low maintenance, is more often influenced by low price than constructional merit.

If progress by manufacturers has seemed slow, it must be remembered that sound design and constructional methods have been in the forefront of development, and that modifications and improvement have been introduced only when experience has shown that they could be adopted with advantage, since cooker manufacturers of standing must study every detail of their product with great thoroughness. But how frequently the supply side of the industry charges the cooker manufacturer with lack of foresight and insists upon the embodiment in the cooker of some feature which the maker knows from experience is undesirable!

While the price at which a product can be sold is mainly governed by output, it is also largely influenced by how much of that output conforms to the manufacturers' standard product. Yet, many purchasers specify details (often unimportant) which, by interfering with the regular flow of production, not only increase the cost of the particular cooker which they demand, but also the cost of production throughout the works which produces it.

These, of course, are but a few aspects of the matter, but they do show that problems exist. No manufacturer wants to dictate to his customers what they shall buy, but he does

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Supply Staffs' Salaries (*Continued from preceding page*)

its ramifications, necessitate certain executive officers in addition to those laid down in our scheme. The scheme proposes that there should be certain key positions as follows:—

Position.	Minimum Grade.
Sales or Consumers' Engineer	3
Chief Assistant Sales or Consumers' Engineer	6
Installation Engineer (Responsible for testing and inspecting of consumers' installations, supervision of direct wiring, fixing and connecting meters.)	6
Appliance Maintenance Engineer (Responsible for testing, installation and repairs of all classes of consumers' appliances which are hired or sold by the Sales Department.)	7
Showroom Superintendent or Manager	7
Assistant Sales Engineers:—	
Senior Sales Assistant	J.8
Sales Assistant	J.9a or equivalent.
Junior Sales Assistant	J.10a or equivalent.

These are the proposals that the Association, after long and careful investigation of existing conditions, confidently submits as a fair and reasonable solution of the problem, together with such amendments as are desirable to rectify anomalies. Doubtless there will be objections raised, and they will be many and varied in character.

One can easily visualise certain municipal committees saying that the salaries are extravagant when compared with those of other municipal officers deemed to be analogous, with an utter disregard of the impossibility of comparing the requirements of the electricity supply industry with the needs of the local government service. Other managements will declare the impossibility of applying these proposals to their staffing arrangements, owing to peculiar circumstances.

Hitherto, the Association's experience with proposals which in any way savour of standardisation has always been the same, namely, that there is immediate opposition from all quarters, based on the grounds that every undertaking in the country has a system of staffing which is best suited to its peculiar needs. This contention was advanced in connection with the original Schedule of the National Joint Board in 1920, and there are indications that the same arguments are still very much alive and will be used again.

The Association confidently hopes that the National Joint Board will be able to agree and insert in its Schedule suitable designated grades on the basis of the proposals. In the unlikely event of the Board being unable to deal with the problem, it will remain for the Association to adopt its own solution and this it will not hesitate to do.

like it to be realised that he is devoting an enormous amount of thought and laborious experiment to the production of an article embodying simplicity, convenience, economy and reliability in use, which will have the maximum efficiency and a high standard of performance. He is, however, frequently told how to design his product, and sometimes how to make it. One wonders what would be the fate of a manufacturer who had the temerity to indicate to the supply undertakings how they should run their business.

Pooling Ideas

And yet there are a number of useful suggestions which could be made—such as the desirability for meter-readers to receive some instruction regarding the domestic apparatus installed in the houses of the consumers whom they visit. At least this might avoid the consumer being advised to "chuck the cooker out, because electric cookers are no darned good," —as was done by a meter-reader not so long ago; or the advisability of demonstrators receiving a special course of instruction from the manufacturers of the product they are called upon to demonstrate, which might prevent the manufacturer being blamed for bad cooking results due to lack of experience; or the advantages accruing to the maintenance staff from tuition in the manufacturers' works, which might save the supply undertaking money and the consumer a great deal of dissatisfaction.

All these services are available to the supply authority, but seldom are they taken advantage of. When the manufacturer offers them, he is frequently regarded with suspicion, as though it was thought that he had a particular axe of his own to grind.

In case it should be thought that these statements are of too sweeping a nature, it must be said that there are many instances of supply authorities taking full advantage of manufacturers' services. And where such services, freely offered, have been availed of, it cannot be doubted that their acceptance has been of advantage to the staff of the undertaking, and that it has helped to establish the best type of relationship between the manufacturer and his customer. In such forms of contact may be laid the foundations of an understanding of the problems and difficulties with which both parties to such an arrangement are faced. And arising out of the opportunities thus offered for the pooling of ideas comes much that is good for both and valuable to the industry as a whole.

Reconditioning Departments

In the atmosphere created by such relationships, schemes have been evolved for dealing with reconditioning problems, and some excellent shop lay-outs have been produced by collaboration between the technical staffs of manufacturer and customer.

Perhaps the lay-out of a cooker reconditioning department offers the best example of the value of a close relationship between the manufacturing and supply sides of the industry. The manufacturer can never hope to compete successfully in the realm of cooker reconditioning, chiefly because of the difficulties which are involved in setting and maintaining a standard.

If the standard set is "as new," the physical difficulties disappear, but the financial problem becomes quite impossible, because a manufacturer's staff, experienced in the production of new apparatus, can have but one interpretation of "as new." With the supply authority's staff, however, "as new" becomes a matter of opinion, and what parts of a cooker are fit to be used again can be reviewed with an air of finality which would be an impossible responsibility for anyone but the owners.

But, in making such observations, let it not be assumed that the manufacturer is merely shelving the matter. Far from this being the case, he is as keenly interested as the supply authority in the question of cooker reconditioning. And, because of his specialised knowledge of production, his aid is of enormous value. When a cooker has been stripped down to the last screw, and all its components have to be reassembled, it presents the same production problem as a cooker in which all the parts are new.

Hence, members of a manufacturer's staff, who are experienced in production, can give the best advice as to the plant and tools properly adapted to the work, and, what is perhaps of greater importance, valuable instructional service with regard to the most economical sequence of the operations involved in dis-assembly and reconstruction.

E.D.A.'s Assistance

Much valuable work has been done in improving the relationship between manufacturer and supply authority by the Electric Cooking Committee and the Domestic Water Heating Committee of the Electrical Development Association. Composed, as the committees are, of engineers representing both municipal and company supply authorities, together with executives representing manufacturers of the types of apparatus under consideration, they have tabled the problems met by both parties in an atmosphere entirely divorced from personal prejudices.

A vast amount of time has been, and is being, given by all the parties concerned, and much valuable help has been given by many supply engineers, not necessarily members of the committees, who have willingly furnished information in regard to the many aspects of the matters under consideration. Numerous reports have been issued, in which the committees have set out the chief points which experience and expediency have shown must be observed in developing the domestic electrical load.

The very wide field covered by these committees, and by the E.D.A. Conferences, which they have sponsored, are too widely known to need recapitulation, but the supply authorities who have given their services on these committees would be the first to admit that the ground covered by their work would have been smaller, and its value to the industry less, if they had not had the advantage of the manufacturers' viewpoints and advice in arriving at their conclusions.

Individual Co-operation

If, therefore, so much good can come out of an organised combination of manufacturers and supply authorities, how much more good might be derived from individual co-operation! Committees, of necessity, can only meet at infrequent intervals. Individuals can meet as often as may be desirable. Surely then, a better and closer relationship between manufacturers and supply authorities must make for greater progress towards the common goal.

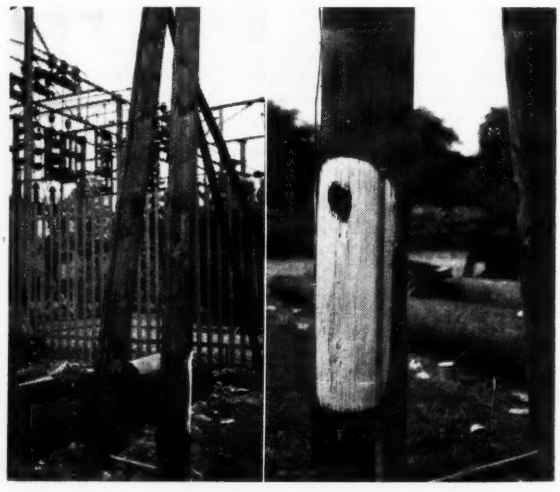
Progress is essential to the continued success of any business, and, as the rate of progress of the electrical industry is dependent upon the service it gives to the public, the value of each organisation must be appraised by the assistance it gives to the industry in achieving that service.

The supply undertakings have done much, by devising attractive tariffs, by the provision of assisted wiring schemes, and by publicity and salesmanship, to foster development of the domestic load, but the manufacturers have done no less, by research, development and improved manufacturing processes, to provide consumers with reliable and attractive apparatus.

Co-ordination and co-operation between supply authorities and manufacturers should at least do something to ensure that there is no wastage of effort, and that progress only follows the soundest possible line.

Damage by Woodpeckers

THE accompanying illustrations show an "A" pole on one of the 11-kV lines near Bishop's Stortford of the Northmet Co. The left-hand picture shows the pole after it had been removed from the line and temporarily re-erected at a depôt. Some 16 ft. have been cut off the butts, *i.e.*, the tie



Damage caused by woodpeckers to wood poles on the Northmet Company

bolt seen in the picture was about 10 ft. above ground level under service conditions. The depths of the holes made by woodpeckers, reading downwards, was 3, 7, 4, 6 and 6 in.

In the right-hand illustration the whitewash indicates the projected area of excavation inside the pole in the case of the bottom hole on one of the limbs.

THE GRID IN 1939

By J. W. Beauchamp, M.I.E.E.

The grid has now been in operation for some years, but there are still many false notions of its purpose and achievements. The author, until quite recently general manager of the Central Electricity Board, puts matters into the proper perspective

THE present year sees Great Britain in a process of national stocktaking—the reckoning of assets and liabilities forced on us by defence needs. Twenty-two years ago another national stocktaking was in progress, for a happier purpose, through the Committees on Reconstruction after the war. The auditor of the future, looking at the changes in our national balance-sheet in this twenty-two years, may well rate bombing 'planes and declining birth rate as major new liabilities; but electricity supply development will surely be reckoned one of our greatest new assets—with its outstanding feature the establishment of the "grid."

The war-time Reconstruction Committees—the Parsons, Merz and Williamson Committees of 1917/8—laid the foundation for the post-war changes in the supply industry, and ultimately—*via* the Weir Committee of 1925—brought the grid into being. In most areas half the first grid tariff decade has now elapsed, and while not yet time for any final judgment, it is surely not too early to draw up some provisional balance-sheet—to ask whether the grid has so far come up to expectations, is yet a dividend-earning asset to the supply industry. Such a "trial balance" is not out of place, for in spite of all that has been written about the grid, misconceptions of its functions still persist.

For instance, there are still frequent confusions between the Central Electricity Board and the Electricity Commissioners; both are sometimes referred to as Government Departments, whereas neither comes within the usual meaning of the term. True, the Commissioners, by delegation from the Minister of Transport, exercise general regulatory powers, similar to those previously held by the Board of Trade—supervising types of construction, sanctioning plant, regulating systems of supply, controlling maximum charges, and so forth—but the Commissioners and their staff are not Treasury-paid civil servants, and the Commission's expenses are met not from public funds but by levies on the supply industry proportionate to kWh sold.

On the other hand, the Central Electricity Board has no juridical powers over the distributing authorities; it is a trading concern, charged with the duty of constructing and operating the grid, subject to no closer Government control than any other supply undertaking operating under statute, and differing from the latter principally in that it is non-profit-making apart from the service of its fixed-interest capital, raised from the general public.

Grid Construction

Although an oft-told tale, it is still necessary to emphasise that the grid differs radically from the "one-way traffic" transmission systems evolved on the Continent and in America. With no very important water-power resources but abundant and widespread coal, the British problem was to overcome the barrier to economic and technical progress left by nearly fifty years of small-scale piecemeal development—there were some 500 generating stations, nearly 400 less than 10,000 kW in capacity; at least 200 consumed more than 3 lb. of coal per kWh generated; over 40 per cent. of the national installed capacity stood idle, even at peak load, merely as insurance against breakdowns. In the large population centres, large-scale production had already proved greatly more economical—how could its benefits be extended to the rest of the country?

By high-voltage interconnection of "selected" stations, chosen not only for economy of operation but also for their strategic relation to load centres and fuel and water supplies and for future expansion potentialities, reserve plant could be reduced to a minimum and each station operated to secure optimum economy of the whole system.

The interconnecting system was estimated to need about eight years to build and to cost £29 millions. The initial grid (which included a considerable amount of secondary transmission assumed by the Weir Committee to be provided by supply authorities at their own cost) was substantially complete six years after the placing of the first contracts. Up to December, 1934, the total capital expenditure amounted to £34.6 million, but this included grid extensions already necessitated by load growth; on a comparable basis the cost of the initial grid was within 2½ per cent. of the estimates.

The national load had to grow substantially to justify such a large expenditure, and here again the Weir Committee's forecast (21,385 million kWh sold by 1940) has also proved remarkably accurate. Twelve-monthly sales to April, 1939, were already about 21,300 millions, anticipating the forecast by at least eighteen months.

At the end of 1938 total grid capital expenditure, including extensions, reinforcements and capitalised interest, stood at £39½ millions, and the Board estimated, on a minimum basis, that the generation capital saved by the reduced reserve plant under grid operation had already amounted to £22 millions—at the end of only some five years' trading. This claim as to capital saving on generation is decidedly modest. From 1922-3 to 1929-30 the industry spent on generation capital an average of £32.6 per kW of increased load, with no evidence of any declining tendency. From 1930 onwards the grid began to affect generation capital, but even over the whole period from 1922-3 to 1933-4 the average capital spent per kW of increased load was £25.2—and, even taking this latter figure as a basis, the generation capital actually expended by 1937-8 was £37.8 millions less than would have been required without the grid.

This saving will continue to grow as long as load increases, since less plant is always required to meet a given load with the grid than without. There is no sign of approaching "saturation" in national demand, and on the ground of economy of capital alone our trial balance shows the grid well on the way to becoming a substantial asset to the industry.

Mr. J. W. Beauchamp

Operating Economies

At stations operating with the grid, average fuel consumption per unit in 1938 was 20 per cent. less than that under independent conditions in 1932, and the Board estimates the consequent saving at the 1938 level of prices at £3.25 millions. Some part of this is, of course, attributable to the increased efficiency of new stations, which presumably would have been built in any event. But the Board's 1938 annual report gives impressive evidence of the reduction under other headings, and the total national saving on operating costs (exclusive of capital charges), even allowing for normal increase of efficiency, is now probably some £6 million per annum; the total charge on the industry in 1938 in respect of the administration, operation, maintenance and capital charges of the grid was £3.85 millions.

Here again, therefore, the trial balance is eminently reassuring. It should be added that the price of fuel has risen steeply during the past three years, and it is difficult to foresee any reduction. Every increase in the price of fuel adds to the value of the saving in fuel consumption by the grid.

Grid Finances

The 1926 Act provided that the Board's budgets should not have an annual basis, but should be so arranged that over a period of years (in practice ten years has been the general standard) income and expenditure should balance, with a safety margin. Authority was given to charge interest to capital and suspend redemption contributions in the earlier years, to obviate unduly high grid charges when the accrued benefits could not be large.

The Board raises its capital from the general public by fixed-interest redeemable stocks, but since the service of this capital forms part of the grid charges, the supply industry is naturally interested not only in the terms upon which the Board issues stock, but also in its redemption arrangements.

The first five issues were at interest rates which now seem unduly high. Even had the Board sought the guarantee which the Treasury was empowered by the 1926 Act to give, it is questionable whether at that time an appreciably lower interest rate would have been practicable, since local authority borrowing was then at round about 5 per cent. None the less,

the particular issues were long-dated (none of the stock is redeemable until 1950), although a fall from the then high level of money rates might perhaps have been foreseen by those responsible.

However, the financial stability of the Board is amply shown by the fact that in 1938 interest on all the stock allocated to grid construction was charged to revenue, although the obligation (which does not become fully operative until 1942) had so far arisen in respect of only about one quarter of the total capital. In addition, the prescribed sinking funds have been duly set up, and since the annual payments are based on the Electricity Commissioners' periods for the amortisation of the various classes of asset, they are amply sufficient to provide for the redemption of the loans at the due dates. In spite of this ante-dating of its obligations, the credit balance on the Board's net revenue account was increased during 1938 by nearly £430,000 to a total at the year end of £2.19 millions.

It is clear that short of a catastrophic national depression there is no reason why the Board should fail to achieve a balanced budget over the first tariff decade.

Relations with Undertakers

So far our "trial balance" is almost uniformly satisfactory, and yet certain sections of the supply industry continue to be critical of the grid. How does this arise?

The basis of grid trading is that the "selected" stations remain in the hands of their previous owners, who operate them to the Board's directions, selling the whole output at cost to the Board, which sells back the owners' own requirements and distributes the balance of the energy produced, through the grid, at "area grid tariffs" which are virtually the pooled generating costs plus a due proportion of grid expenses.

The Board is not empowered to call for the closing down of a non-selected station unless it can be shown that the cost of a tariff supply is less than the cost of production at such a station, exclusive of the capital charges thereon (which, of course, continue to be paid by the owner if the station is closed down before amortisation is complete). The selected station owner is protected against loss by the right of choice, in the price for his own supply, between the area tariff and the cost of producing his own requirements at his own station plus a due proportion of grid expenses, with the over-riding provision that the cost of the grid supply shall not exceed that which the owner would have incurred in generating the like amount of electricity independently.

In practice, since the more efficient selected stations are in general situated in consuming centres of advanced load development, a high proportion of the total energy dealt with by the Board is sold on this basis of hypothetical independent cost. The selected station owner buying back his requirements on this basis claims that his undertaking is not getting any benefit from the grid, although providing the efficient plant, trained staff and skilled management which make grid economies possible. The Weir Committee, he explains, led him to expect more material benefit than the halo of an altruist, and the grid has therefore not come up to his expectations, whatever benefits it may have conferred on others by his co-operation.

He may even put forward the argument (though sympathy with the point of view is perhaps a little difficult) that the 1926 Act has, in spite of its avowed protection, damaged his business, since he is no longer free to enter into profitable contracts for bulk supplies to his neighbours, who must now by the Act be supplied at cost.

Are Complaints Justified?

But has he real ground for complaint? True, the grid scheme may not have brought him benefits in proportion to those accruing to the small undertaker. That was never the intention, which was to bring the advantages of large-scale production to the less fortunate areas, and it is inevitable that the latter shall reap the more immediate benefit. But is it really a fact that the selected station owner buying at the hypothetical independent cost is yet deriving no benefit from the grid?

Even in bulk supplies given at cost he has the advantage of the lower combined price for his own supplies. His generating capital has become virtually a gilt-edged security (and in the case of a company-owned station, a somewhat attractive security in these days, since a maximum of 6¼ and 5 per cent. is guaranteed thereon). He is linked to the grid, which has often enabled him in time of trouble at his station to maintain supplies to his consumers. And is it really common sense to suppose, in a practical business world, that the selected station owner, acting in the interests of his own undertaking, will over-state those hypothetical costs (inevitably more difficult to assess with every year that passes), or that the practical compromise of agreement with the Board will invariably be unfavourable to him? The wide divergence between the capital saving claimed by the Board and that appearing reasonable judged by past development suggests otherwise.

A more cogent criticism, surely, is that the rigid framework of the 1926 Act distributes the savings to the whole group of selected station owners unevenly, in a manner disproportionate to the services rendered to the grid. The Board has shown itself prepared to consider arrangements to remedy this anomaly, so far as is practicable without jeopardising the finances of the grid, by pooling and distributing more equitably the savings over a period in each area, and the selected station owners in North-West England have taken the pioneering step of entering into such arrangements. It is now public knowledge that the first distributions from the "pool" in that area have already been made—which is sufficient to show that advantages are already accruing to some selected station owners from the grid.

The other section of the industry which has recently been critical of grid policy is the undertaking supplied at the area tariff which finds itself called upon to pay for the heavy load placed upon it by the cold spell of last December. The grid tariffs are in two-part form, consisting of a running charge for every kWh taken and an annual charge per kW based upon the highest half-hourly demand recorded in the winter months.

The owner of the small undertaking asks why he should pay for the whole year on the basis of a single exceptional half-hour, and suggests a modified basis, such as a charge based on the average demand over the four winter months. He forgets that if generating locally he would have had to provide and pay for sufficient plant for that exceptional half-hour's demand, not only last year but every year, whereas under the grid tariff he pays only for such exceptional demands if they arise—and makes no corresponding payment to the Board for the plant provided for his requirements when, as in 1934, exceptionally mild weather causes demand to fall below expectations.

The Pre-Grid Position

Memories are short, even in the supply industry, and it seems to have been forgotten that there was a similar "cold snap" in February, 1929, the results of which were reviewed by a committee, appointed by the Electricity Commissioners, which recommended supply authorities so to adjust their own tariffs to their consumers as to provide an average return over a period of years adequate to "meet any cost due to the rare occasions when exceptionally cold weather prevails; and if this is done they need not continue to be apprehensive of the possible effect of cold spells."

Cold spells are not the only forms of exceptional demand which are causing apprehension in certain quarters. "Domitory" undertakings having little industrial load are concerned that the development of electric cooking may saddle them with a consistent morning peak, and it has been suggested that owing to similarity of consumer habits the expansion of domestic water heating may eventually cause a dominant "water-heating" peak. Problems of this nature have occurred in the past, and will doubtless recur more frequently in the future, as the valleys in the load curve are filled up. Their solution lies in a well-ordered and balanced development on the commercial side of the industry.

After all, it must not be forgotten that as the grid is not a profit-making concern, the area tariffs are merely machinery for the equitable allocation of costs. To adopt the suggestion of a charge based on averaged winter demands would only raise the charge per kW, perhaps to the advantage of those undertakings having a poor load factor, but obviously to the detriment of those which cater primarily for industrial loads.

Conclusion

Our trial balance shows the grid to be financially stable, already contributing net dividends to the supply industry and to national prosperity. The engineering principles are sound, and are standing the practical test of year-to-year working. The distributing undertakings are not least among those to whom credit for the progress of the grid is due, for they have given widespread co-operation in a policy of which in the early stages they were frequently sceptical.

There are still grid problems to be solved, perhaps the greatest being the basis of accounting with the selected stations, for the Act provisions must grow more and more artificial as time passes. But there is every reason to suppose that the problems will be overcome, and the grid be fully successful, and the ultimate measure of that success will be the extent to which it ceases to be regarded as superimposed, but is accepted as an integral part of one of our greatest national assets—the electricity supply industry.

WHAT OF THE CONTRACTORS?

Their Relations with Municipal Supply Authorities

By E. E. Hoadley, M.I.E.E.

THERE are numerous problems in the electricity supply industry which have given rise to a great deal of controversy, and it will not be denied that the problem as indicated by the title of this article is not the least controversial of the many that are now before the industry.

I have been interested in this problem for very many years, and as a result of much thought and many discussions with both sides, I am firmly of the opinion that, provided factors not germane to the issue can be kept out of the argument, a solution satisfactory to both sides can be found. Unfortunately, it is very difficult and, in some areas, impossible to confine the discussions within the limits indicated and in such cases it is more difficult to arrive at a satisfactory solution.

A problem which is nearly as old as the industry still remains unsettled. The author shows that it is possible for supply authorities and contractors to "dwell together in unity."

The scope of this article is confined to the relations between the contractors and municipal supply authorities; with the relations with supply companies, I do not feel myself competent to deal.

During the last two years efforts have been made to find a formula for a working agreement between the two sides, but after much time spent in exploring the position, it remains *in statu quo*. The problem can be solved in several ways :—

(1) By the supply industry making up its mind that contractors are redundant, and emulating its sister industry, which has decided in a large majority of places that all work connected with both the supplying and using of gas, shall be carried out by the gas supply authority.

(2) By definite arrangements between municipal supply authorities and the recognised contractors' associations, or

(3) Matters can be allowed to drift on as they are at present.

There is no doubt whatever that protagonists of each of these ways can be found, who will put up very strong arguments for their case. Most of them do not recognise that to every case there are two sides.

In certain towns the position and influence of the supply authority has been used to the detriment of contractors, but how far this practice persists to-day is a question upon which it is very difficult to procure concrete evidence. There are several reasons for this difficulty, some of them self apparent.

Mr. E. E. Hoadley is chief engineer and manager of the Maidstone Corporation Electricity Department

In trying to arrive at a settlement of these outstanding grievances, there are a number of things which have to be considered, and which prevent some simple solution being universally acceptable. The factors which have to be taken into consideration are :—First, the political colour of the particular council owning the supply undertaking; secondly, the strength of the local Chamber of Commerce, and other similar bodies; and thirdly, the personal opinion of the engineer in charge of the supply undertaking.

As engineer to a successful supply undertaking of medium size, I have proved that a scheme of co-operation with recognised local contractors can be operated to the benefit, financially and otherwise, of both sides, and that complete agreement can be obtained between the two parties. I had great hopes at one time that some solution very much on the lines of our scheme would be recommended for the general approval of municipal supply authorities and contractors, but, unfortunately, the negotiations did not arrive at fruition.

It is recognised by many people, and particularly by those who have been concerned with the problem for some considerable time, that feeling on both sides does at times run high, and that the problem bristles with difficulties; in such cases I am fully aware that my opinions will not meet with universal acceptance, and that in enunciating them, I am laying myself open to much criticism. This cannot be helped.

Some of the difficulties in arriving at universal settlement are due to the fact that there are wide differences between the conditions existing in London and other big cities, such as Birmingham, Liverpool and Manchester, and those existing in the medium-size or smaller towns.

Whatever may be said by the wildest supporters of municipal trading, I consider that wiring contractors are definitely necessary in the big cities, but there will be supporters of the argument that in the smaller towns the supply authority could get on just as well, or perhaps better, if no such thing as a wiring contractor existed in that town. This argument might be capable of support, provided the industry was starting *de novo*, but the fact remains that contractors do exist in nearly every supply authority's area. Such being the case, it is my firm and considered opinion, that the best solution of the problem consists in the formulating of a scheme by means of which the greatest use is made of the services of recognised contractors, and that they, together with the supply authority, shall work together as one harmonious body, with the primary object of selling more and more electricity.

It is a very old and true saying that "the labourer is worthy of his hire," so it ought to be recognised that each side should benefit financially through their efforts, perhaps in proportion to their efforts, if such arrangement is capable of application. Further, it should be remembered that while the contractor gets only one profit out of the job, the supply authority gets a continuing profit.

The question of working together with contractors can be divided up under a number of headings, some of which are :—The method of the use of the supply authority's showrooms; the carrying out of wiring work; the hire and hire-purchase of apparatus; canvassing for new business; and the maintenance of wiring and apparatus on consumers' premises.

I do not wish to suggest that the Maidstone scheme is the best. Probably there are many better, but it is put forward as one which has worked for a number of years to the benefit of the undertaking and the business satisfaction of both sides. The scheme pre-supposes that wiring contractors are necessary for the welfare of the industry as a whole, and secondly, that showrooms belonging to municipal electricity supply undertakings should be looked on as a legitimate publicity expense, and not as a source of profit, *per se*.

The Maidstone Corporation decided many years ago, that while electricity supply was its business, and should be done as successfully as was possible, it was no part of the Corporation's business to interfere with private traders, particularly in cases where their interests were more in unison than at variance. It was claimed, however, that there were some branches of electricity supply in which the supply authority must have an absolutely free hand, as this particular work could only be done by some person or body having a continuing interest in it, and could not be carried out by someone who had the immediate transaction as his sole source of gain.

Starting from these premises, a scheme was put into operation which has given great satisfaction not only to the Electricity Committee but to the Maidstone contractors as a body. A local branch of the Electrical Contractors' Association has been formed, and the committee of this branch has regular meetings with the chief engineer and consumers' engineer of the Electricity Department at which all matters affecting the local supply are discussed, while any matters of controversy are sorted out and the causes of friction are removed or explained.

Handling Appliances

The first point of agreement between the contractors and the Department was to the effect that all electric cookers, electric water heaters and wash boilers, except when bought outright, could only be handled and installed by the Electricity Department, and that the necessary wiring for these pieces of apparatus should also be done by the Department, except in cases where a contractor was wiring a house in which the tenant or owner was installing a cooker or water heater, in which case in order to avoid two lots of men on the same

job, the Department pays the contractor the net cost of the wiring for such appliances on an agreed scale.

With the exception of this class of work the Department does no wiring. The wiring of municipal buildings is put out to contract on a specification prepared by the Department, to which only recognised contractors are asked to tender, while under the Corporation's assisted wiring scheme, all work is done by members of the local branch of the Electrical Contractors' Association to a specification prepared by the Department and to an agreed price per point.

The orders are sent to the secretary of the local branch and he is responsible for sending them out in the right proportion as agreed with his members. The secretary also sends in monthly accounts to the Department which are checked and the money paid to the secretary, who apportions it out among his members. This method of working has ensured good work done at a fair price, and no troubles of any sort.

Canvassing and Showrooms

Canvassers are employed by the branch and not by individual contractors. They are paid in part by commission on what they bring in, this commission being paid partly by the local branch of the E.C.A. and partly by the Department, in agreed proportions. The division of the work obtained by the canvassers among the various contractors is settled between themselves; the Department takes no hand in it.

The Department runs and staffs its own showrooms entirely but any consumer can go into the showrooms to select any fitting or piece of apparatus, and, if he prefers, take it away with him, subject to satisfactory reference, but nothing is sold by the Department except through contractors. The method of arranging this need not be explained as it is quite simple and subject to many variations, all of them producing very much the same result. Of the trade discount, 10 per cent. is kept by the Department and the rest is credited to the local branch of the E.C.A., the individual contractor being named, and a cheque paid by the Department to the secretary of the branch each month.

The hire and hire-purchase of apparatus, which is confined in Maidstone to a few articles only, has presented no difficulties, for the reason that the large majority of cookers and water heaters are on plain hire. Refrigerators are dealt with by the contractors as well as by the Department, and the only small article hire-purchased is the flat iron, this being done purely as being the first service beyond lighting that a householder usually asks from electricity, and as it nearly always gives complete satisfaction, it is felt that an iron is a very good introduction to other uses.

The success of an electricity supply undertaking is dependent to a much larger extent than is realised by some engineers on the service which it gives to its consumers. It must be understood that the day is long past when a consumer paid for electricity because it was electricity; he now does not really worry much about electricity, but only the services which electricity can give.

It is generally admitted that most of the services required in a household can be rendered by electricity, certainly as well as, and perhaps better than, by any other agent, and in very many places, at a lower cost, but all this may be discounted if troubles arise through failure of apparatus or supply.

I have argued this question of maintenance at great length with presidents of the E.C.A. and many lesser lights, and hope that I have convinced them that the only people who can undertake real maintenance are the supply authorities themselves.

The Electricity Department at Maidstone supplies electricity over an area of nearly seventy square miles, and for the whole of this area, a service is undertaken between 7 a.m. and 10 p.m. on weekdays with service on Sundays from 7 a.m. to 1 p.m., and from lighting-up time until 10 p.m. This work demands service men continuously on duty during these hours, and the use of small motor vans and motor cycles, together with a highly organised spare-parts store. The service is such that it is claimed that any urgent telephone request received is dealt with on the consumer's premises within thirty minutes, even in the remoter parts of the area.

While it is not claimed that the service has never failed during the years it has been in operation, it can truthfully be stated that not a week passes without expressions of appreciation either by letter or telephone of the service given by the Department.

It might be argued that to give such a service is expensive; it certainly costs money, but I claim without fear of contradiction that such a service is necessary to-day if electricity supply for domestic purposes is to go ahead in the way that is so much desired by all who have the good of the industry at heart.

Inspiring Confidence

It will be admitted that an unattended-to complaint or a small breakdown at an unfortunate time, does more to damn electricity supply in the opinion of the consumer than a great deal of rival propaganda. Whereas, if the consumer feels that any apparatus, which she knows is not infallible, will, when it breaks down, be attended to forthwith, she gets a feeling of confidence which is one of the first steps towards obtaining a satisfied customer. Let every consumer, whether male or female, and particularly female, feel that the Department realises the truth of the following statement "You want the best service, we give it."

To sum up. It is my earnest wish that by some means or other the differences which exist between many supply authorities and the contractors within their areas may be bridged over, and as it does not seem possible, even if desired, to do away with contractors entirely, surely it is far better to arrive at some mutually satisfactory settlement of the differences, so that the contractors may work with the undertaking and the undertaking with the contractors to the mutual advantage of all concerned, rather than that the two parties should pull in opposite directions to the good of neither.

New Callendar Steam Tables

THE issue of the new Callendar Steam Tables (Edward Arnold & Co., 41, Maddox Street, London, W.1, 15s. with thumb index, 12s. 6d. without) after an interval of only eight years since the previous issue indicates the amount of research that has been carried out recently in the laboratories in South Kensington.

Mr. Callendar and Professor Egerton, F.R.S., who were responsible for compiling and editing the tables, are continuing there the work of the late Professor Callendar, and are doing so in collaboration with physicists in America, Berlin and Prague. This volume, therefore, represents work done in all those centres and it leads one to hope for, and expect ultimately, an internationally agreed table.

The 1939 Tables differ from those of 1931 in some respects other than the incorporation of the more accurate figures based upon the later experimental work. Table I dealing with low pressure dry saturated steam is unchanged except that the vacuum and pressure column is not repeated at the right-hand side of the page. This is no disadvantage as the lines are easily followed across the page.

Table II covering saturated steam and water is quite new although nearly all the data was given in, or could be obtained from, the 1931 Tables, where it appeared at the head of each pressure column. In the latest issue the data is based upon temperature. This is useful as it is no longer sufficiently accurate with feed water temperatures exceeding 400 deg. F. to assume that the specific heat of water is unity. The total heat of water at saturation temperature and other data are given up to temperatures of 705 deg.

Table III of 1939 is the same as Table II of 1931 except that the upper pressure limit is now 3,200 lb. per sq. inch instead of 4,000 lb. This is still much above the maximum used by any turbine engineers and will cause no inconvenience.

A very desirable addition is the inclusion of the skeleton table adopted by the Third International Steam Tables Conference held in New York in the autumn of 1934. As a method of obtaining ultimate agreement, the Conference attached a tolerance to every figure in its tables. It is interesting to note that at 200 lb. per sq. in. absolute and a temperature of 50 deg., the enthalpy, or total heat, is apparently known with an accuracy of one part in 630 but that at 3,000 lb. and 1,000 deg. the tolerance is one part in 390. One would be inclined to say that such accuracy as one part in 630 is sufficient for all practical purposes having regard to the possible and probable departures from the designers intentions both as regards design and workmanship.

As a pointer in this direction it is noted that the constant "B" used for calculating the adiabatic heat drop with the steam in the final stage still dry is given as 835, whereas previously it was 835.2. The last figure has been omitted as this constant was certainly not accurate to one part in 8,300. The skeleton tables are given both in the British system of units on page 8 and the metric system on pages 55 and 56.

It is interesting to compare these Tables with those published prior to the start of Professor Callendar's work. Thus in Perry's volume "The Steam Engine" published in 1899, the entire properties of water-steam are given on two pages and only go up to 300 lb. per sq. in. absolute. No particulars regarding superheat are given but simple linear equations were provided for obtaining the total heat of superheated steam based, of course, upon the assumption that the specific heat of steam was constant, which later experience has proved to be widely incorrect.

The present Tables cover 64 larger pages. This difference shows the greater detail which modern engineering requires as compared with that of only 40 years ago.

ELECTRICITY AND HEALTH

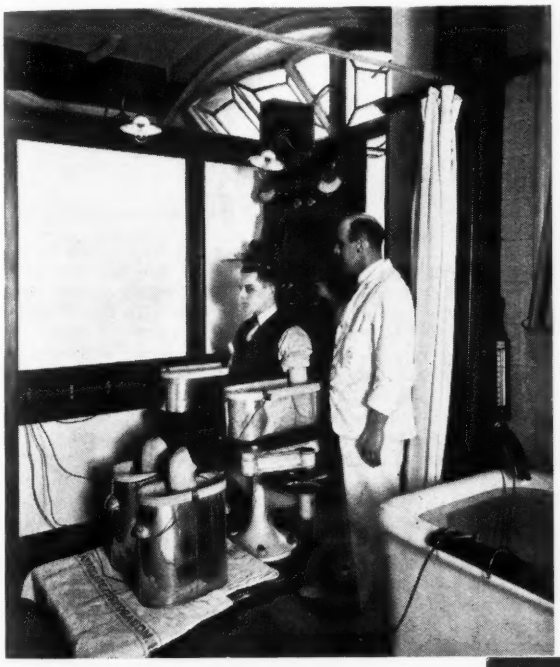
Apparatus and Methods of Application

By C. Morgan Davies, A.M.I.E.E., A.H.O.A.

The author mentions the wide variety of electrical apparatus which is now used in the curing and relief of human ailments. Good examples of the treatments available are to be seen at Harrogate.

FROM the beginnings of electrical science the therapeutic properties of electricity have been the subject of continuous investigation. Indeed, the distinction of adding the word "electricity" to the English language appears to belong to Dr. Gilbert, the Elizabethan physician, while one of the earliest practical applications was in connection with efforts to cure paralysis, Benjamin Franklin having used charges produced by frictional means for this purpose.

The benefits to be obtained from the various forms of electrical treatment and from electrically produced radiations are now fully recognised and the science of electro-therapeutics is firmly established as an important section of medical practice. Apart from the direct and in-



Direct AC limb bath apparatus

direct applications of electricity for purely therapeutic purposes, many electrically operated devices are in common use as aids to diagnosis, while electrical treatment has developed in combination with massage and hydropathy.

This is well exemplified at the Royal Baths at Harrogate Spa where there are thirty-eight natural mineral water springs and differing treatments are applied to a wide range of ailments, including the rheumatic group of diseases, circulatory disorders of the blood, the treatment of fractured limbs, nervous disorders, stomach and intestinal diseases, liver disorders, skin diseases of all kinds and for numerous other requirements, including the toning-up of the system during convalescence.

Types of Treatment

Galvanic, faradic and sinusoidal treatments all involve the application of a selected current, or combination of currents, directly to the body in such a manner that the tissues to be treated form part of the electrical circuit.

The term galvanism refers to the technique of passing continuous currents through the body and is derived from the battery of galvanic cells which originally served as the source of supply for this purpose. The essential apparatus consists of a source of steady direct current, a means of varying the voltage from zero to a maximum not exceeding 75 V, a centre-zero milliammeter and the necessary application electrodes and connections. A reversing switch provides for changing the direction of current flow when required and a metronome fitted with contacts causes periodic interruption at selected intervals. This can also be fitted for automatic periodic reversal of flow when necessary. For certain purposes an adjustable resistance may be provided for surging.

The modern outfit for operation from AC mains usually draws its supply from the smoothed output terminals of a full-wave metal rectifier. It is possible to draw the current for galvanism direct from DC mains provided suitable precautions are taken efficiently to insulate the patient's circuit and to prevent any possibility of accidental earth contact, which might result in shock through interaction with low insulation elsewhere on the system.

Although this method is not so favoured as "earth-free" supply for obvious reasons, it is frequently employed; the patient's circuit being tapped off a potentiometer, one end of which is connected to the earthed neutral while the other returns to the live outer via a suitable fixed resistance.

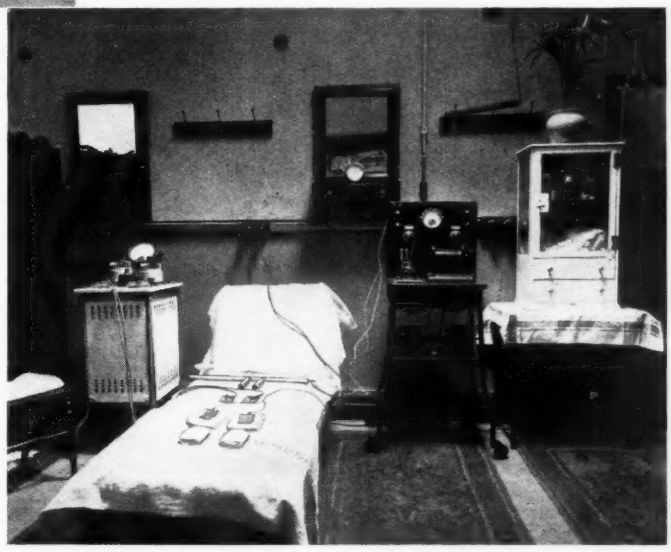
The effects of the galvanic current are twofold, physiological and chemical. The first is utilised for direct stimulation and toning of muscles, the passage of the current causing the muscles to contract consequent upon their own irritability. The current is also used to determine the condition of muscles, their responsiveness or reactions serving as an indication of condition.

The treatments are given by means of electrodes fitted with pads moistened with saline solution, the current density under the electrode which is applied directly to the part under treatment being of the order of 1 mA per sq. in. Galvanic treatments are also given in baths, particularly when general application is desired. The current is then much higher, as most of it flows in parallel paths to the body, through the water between the electrodes.

The chemical action of the current is beneficially employed under the heading of ionic medication, or ionisation therapy. This is designed to introduce various drugs and metallic salts to parts requiring treatment, by electrolytic action. Typical examples of this form of treatment are the deposition of zinc on the affected membrane in hay fever and the introduction of colloidal solutions to acute inflammatory regions, such as frequently occur in injured and swollen joints.

Ionisation, or anodic galvanism, has been effectively employed to restore arrested circulation, in which case appropriate positioning of the electrodes is of some consequence.

Faradism is the term associated with the direct application of the pulsating output from a small induction coil. Numerous patterns of these coils have been produced, varying in wave

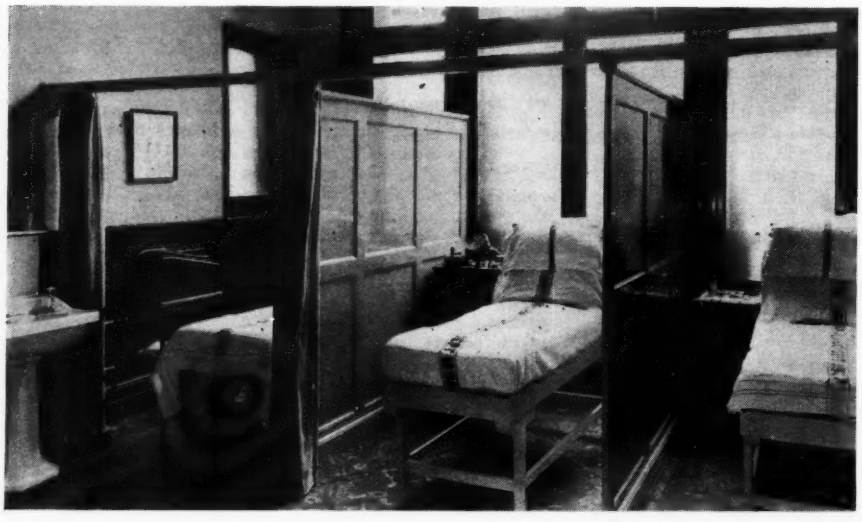


A low-frequency AC and low-voltage DC treatment room

form, the method of connecting the patient and the method of controlling the current during treatment, the selection of type depending largely upon the particular medical requirements. These coils may be operated from a 2- or 4-cell battery or from DC mains through a suitable resistance.

The primary winding is fitted with a loose core which can be pushed in and out for purposes of surging, and the rate of induction into the secondary is determined by a hammer break fitted with an adjustable system to control the rate of vibration. The secondary output is also adjustable by the provision of a few tappings which lead to the patient's terminals.

The faradic coil is used mainly for muscle stimulation, but the current differs from the galvanic in that it acts on the muscles only through the nerves controlling them. The wave form is, of course, reversing, but the small amount of inverse which occurs during the "make" period in the primary is negligible for producing muscular contraction as compared to the direct induction occurring at break. The frequency of the impulses producing contraction is such that the muscle cannot relax between them and is therefore held contracted and under control by the operator.

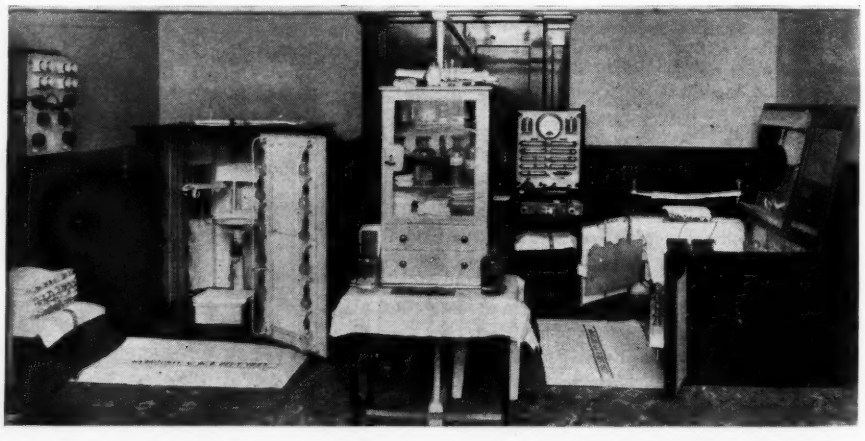


Typical treatment cubicles

Sinusoidal treatment involves the direct application of AC to the body tissues. This may be furnished by means of a small double wound transformer having a secondary wound for 60 to 70 V. The patient is connected via a suitable potentiometer, the current required being of the order of a few mA.

Application is usually by means of baths in which the limb under treatment may rest between suitable electrodes, and a motor-driven variable choke is often incorporated to produce a surging effect.

The sinusoidal current has various uses and is of particular value for improving the circulation of the blood, often necessary following upon injuries; also for the treatment of chilblains and kindred ailments. Modern units for universal application provide facilities for carrying out any of the three principal forms of treatment with selective arrangements for utilising plain, interrupted and reversing currents, surging, or combined currents, as required. In the case of DC supply, the apparatus draws its isolated or "earth-free" supplies from a small rotary convertor fitted with a double wound armature. The AC models operate through built-in isolating transformers and incorporate the necessary rectifiers and smoothing components.



Radiant heat baths

High-Frequency Applications

High-frequency currents are much used in medical work, chiefly for the purpose of heat production. D'Arsonval laid the foundations of modern high-frequency technique and the development of the necessary apparatus has been greatly aided by progress in radio engineering.

Galvanic, faradic, and normal sinusoidal currents cannot be applied for generating heat in the body owing to the limitations imposed by muscular response. The application of high-frequency currents produces no electrolytic or faradic effects, consequently the valuable heating property may be fully utilised. The apparatus of D'Arsonval, consisting of two Leyden jars and an inductance excited by an induction coil, was later displaced by the diathermy apparatus. This consists of a simple spark-gap-operated oscillation circuit fed from a step-up transformer which develops about 4,000 V. The circuit arrangements vary in detail, but the oscillations set up in the primary inductance are usually transferred to the secondary or patient's circuit by inductive coupling.

For direct heating of the tissues, the patient is connected by means of suitable electrodes. The current is observed by means of a thermal ammeter and varies with the degree of coupling and the resistance of the path which is traversed through the body.

Outputs vary between approximately 250 and 750 W at frequencies of the order of 1 to 2 million cycles per second and the voltage active in the patient's circuit is usually of the order of 100-200 V for normal medical treatments.

Although spark-gap diathermy is still widely employed, it is slowly being displaced by the more recently developed short-wave apparatus which utilises thermionic valve circuits as the source of oscillatory energy. The term "short-wave therapy" distinguishes the new technique from the older "long-wave diathermy," the frequencies employed in the modern case varying from 10 to 100 million cycles per second.

The high-frequency energy used in short-wave therapy is not applied to the body by means of contact electrodes, as is usually the case in ordinary diathermy, but through the condenser or, alternatively, the inductor field. In the former case the patient is placed between condenser plate electrodes, while in the latter the limb under treatment forms the core or is placed in the region of a coil carrying the high-frequency current. By these means the short-wave field passes through and heats the part requiring treatment. The primary circuit employs a self-oscillating triode, the patient's circuit usually being inductively coupled to this and tuned by a variable condenser.

Important advantages are claimed in connection with short-wave therapy, mainly in conjunction with selective heating of various forms of tissue and increased range of application. Diathermic and short-wave currents are applied for many purposes, including rheumatic diseases, heart derangements, dental treatments and a variety of septic conditions. High-frequency treatment is also applied in the form of "effluve," sometimes termed breeze or brush discharges. The heating effect here is negligible, the application being by spark discharges from open electrodes of various shapes or hollow applicators of glass which have been evacuated. Typical uses are in

conjunction with nervous trouble, baldness, and general stimulation of the skin.

The different forms of radiation which are produced electrically may be applied beneficially to a number of human ailments. Radiant heat is sometimes applied alone or is utilised in conjunction with some of the previously mentioned electrical treatments, massage, or ultra-violet radiation. This form of treatment depends upon the application of the infra-red rays emitted from carbon lamps and various types of wire-wound elements suitably mounted for the particular requirements. The smaller baths designed for local heating are usually formed in two parts hinged together to fit around the limbs, larger models in the form of tunnels being applied for irradiation of the trunk. For general heat treatment the body is completely enclosed in a bath with a suitable opening to accommodate the head and neck. These are often applied to cases where it is desirable to induce perspiration.

Artificial sunlight produced by carbon arcs provides a good substitute for the somewhat elusive natural sunlight. Lamps for general treatment are usually of the long flame type and operated off DC or AC. The composition of the spectrum is varied by coring the carbons to suit particular requirements, nickel-cored carbons producing a spectrum closely approximating to that of natural sunlight.

When high ultra-violet output is desired, particularly in the region of the shorter wavelengths, mercury-vapour arcs are utilised. Quartz burners of the evacuated type having mercury electrodes are much favoured for this work, but are gradually being displaced by the more efficient electronic discharge tubes which contain a filling of mercury and argon and utilise electrodes of the solid activated type. The spectrum of the mercury vapour arc contains a high percentage of ultra-violet, but is comparatively lacking in infra-red radiation. For this reason mercury-vapour lamps are frequently supplemented by a source of infra-red radiation.

The shorter wavelengths of the ultra-violet waveband have a definite germicidal action and are therefore useful for treatment of a number of septic conditions, and to assist the healing of wounds. For short-distance, localised, application a concentrated type of mercury arc is used, the quartz burner being enclosed in a casing through which water circulates to absorb the heat-producing radiation. The arc produced between swaged rods of tungsten is much favoured in small sizes for DC operation.

Any survey of the applications of electricity to medicine and surgery would be incomplete without mentioning some of the many other important aids to diagnosis, treatment and surgical practice. X-ray diagnosis by fluorescent screen examinations and radiography embraces a highly specialised field which has now become sufficiently complicated to necessitate its segregation from X-ray therapy, the value of which is well known in connection with the treatment of cancer and a variety of skin diseases.

The electro-cardiograph occupies an important position as an aid to the investigation and observation of heart troubles and has been much developed since the introduction of the cathode-ray tube. In the field of surgery the most important introduction of recent years has been the high-frequency spark cutter, which has proved a safe and efficient instrument for a number of difficult operative requirements.

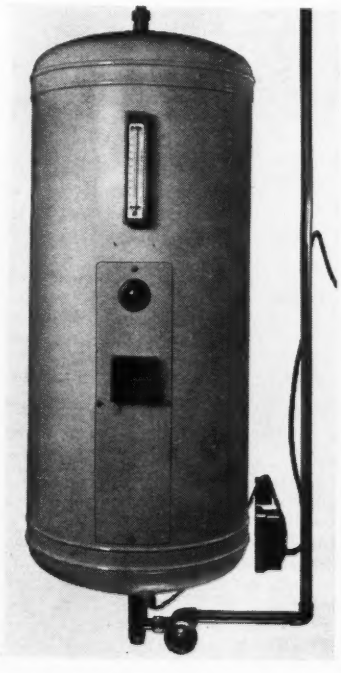
The successful outcome of improved methods can usually only be claimed after lengthy periods of observation, and progressive development is dependent upon a three-cornered understanding from the aspects of medicine, physics and engineering, the difficulties are fully apparent. In spite of these, progress during the last twenty years has been remarkable. The general standard of production in small electro-medical equipment is not so good as that now reached in the manufacture of X-ray plant, and although it has improved much during the last five years, there is much to be done before conditions approaching perfection are reached.

The illustrations which were lent to us by the Harrogate Baths and Wells Department show equipment in use at Harrogate.

Load-control System

THE "Hallowell" ripple control system marketed by Thomas Jennings & Sons, Ltd., Permanent House, The Headrow, Leeds, has been designed for controlling the peak due to any kind of load having a storage medium, such as water heating, pumping, refrigeration and electro-chemical processes. An important feature is that the load may be controlled automatically to follow the load curve.

For instance, water heaters can be switched on and off a few at a time at intervals according to the demand on the sub-station. By this method, it is claimed, the average restriction period is halved. By means of selective action water heaters at the highest temperature are switched off first and those at the lowest temperature are switched on first. Experience on the systems of the Yorkshire Electric Power Co. and Electrical Distribution of Yorkshire, Ltd., has demonstrated that restriction periods of as much as four hours have been unnoticed by domestic consumers.



A 15-gal. pressure type heater fitted with "Hallowell" control, indicator lamp and thermometer

A small input of high-frequency energy is injected at the control point and picked up by closely-tuned sensitive relays at low-voltage distribution sub-stations. In each sub-station a frequency multiplier, embodying an arrangement of saturated chokes and condensers and supplied direct from the mains, repeats the impulses received and injects them between phases and neutral of the low-voltage system. No series connections are employed and the power-factor correction condensers connected between phase conductors are said not to exercise any damping effect. The load controllers can be connected to any current-transformer circuit and they are stated to be self-resetting with day-to-day increase of maximum demand.

Sub-station repeater and (above) an indication of the small size of the "Hallowell" unit

A "user's control" measuring only 3 in. cube is fixed in heat conductive relationship with its associated thermal storage tank and operates (by virtue of the co-ordinated action of a ripple-frequency relay) a thermostatic switch and thermal time-lag device. The opening sequence is on a time-temperature basis responsive to a train of impulses despatched by the sub-station repeater. Only one frequency is employed, the closing sequence being inherent in the thermal time lag device of the user's control.

STATISTICS AND SALES

More Information Wanted

By W. E. Swale, A.M.Inst.C.E., M.I.E.E.

THE I.M.E.A. Convention, which acts as a great clearing house of ideas relating to the electricity supply industry, is increasingly occupied with sales policy. The importance of statistics in furthering development is therefore a proper subject for discussion. The industry has already reared a fine forest of figures in which it is becoming increasingly difficult to see the wood for trees. In what way can these statistics be nurtured, pruned, and trained so as to achieve the maximum efficacy in pointing the way to balanced development?

Those alike who use and who prepare statistical data frequently ask: "Where can I find, easily and quickly, the figures which I want myself?" "Why must I spend so much time in preparing masses of figures for others?" "Are the figures now available in the industry trustworthy, consistent, and prepared according to the best statistical practice?" It is said that the borough treasurer of a certain municipal undertaking in his official returns for several years gave in place of the number of consumers the number of meters connected to the system. A mistake such as this (if the incident be true) exemplifies the pitfalls into which the unversed may fall.

Although many returns are called for from supply undertakings there is still a lack of co-ordination and completeness in the matter of helpful statistics. The author suggests consideration of remedies.

The leading article in the ELECTRICAL REVIEW of April 14th last, under the title "Facts and Figures," invited discussion on various aspects of this question. The Commissioners' annual fuel return of generating stations, compiled in such a way as to permit valid comparisons, "has led to a healthy rivalry which has no doubt helped to improve generation standards." Similar healthy rivalry has already been stimulated by the publication of unofficial records of the results obtained by different undertakings in the connection of domestic cookers, wash-boilers and water heaters. Much more might still be done on these lines.

The Electricity Commissioners no doubt had good reasons for deciding the form in which certain returns were to be made in the early issues of their Statistical Returns. But one would like to know whether there are any valid objections to attempting a revision from time to time to meet the changing value of electricity to the community. A striking instance of present day inadequacy is the continued publication of "units sold to consumers" under only four headings, viz.:—

Mr. W. E. Swale is power sales engineer to Manchester Electricity Dept.

	Percentage of total sales (in 1937-38)
(a) For lighting, heating and cooking ...	38.1
(b) For power	54.1
(c) For public lighting	1.8
(d) For traction	6.0
	100.0

The bulking together under item (a) of three groups of "user" having totally different characteristics is, to say the least, unscientific and renders impossible a direct comparison of the progress of any one of the three.

Undertakers are already required to sub-divide returns of sales quantities according to the tariffs on which each sub-group is charged. The information is therefore at hand for a further sub-division which would be of the greatest interest and use to the industry. It merely means making a *separate return* of lighting sales (both flat-rate and compound tariff). The balance of sales under the present heading (a) will then comprise the consumption in private houses under "all-in" tariffs (including a proportion—negligible with regard to the total—of domestic lighting) and heating and cooking in business premises, also a relatively small proportion of the total. The new sub-division would then be:—(a) For lighting (where metered separately); (b) for domestic and business premises (excluding power metered separately); (c) for power; (d) for public lighting; and (e) for traction.

In rather a different category are proposals for the extension of information now called for in the Supplementary Statistical Return. Such proposals would definitely call for extra work on the part of undertakers themselves, and would no doubt give rise to some opposition or else passive non-co-operation. Yet every industrial sales engineer is keenly conscious of the benefits to be derived from the possession of more detailed official data, particularly with regard to industrial heating and potential power loads. The "Supplementary Return" was first issued to undertakers early in 1935 in respect of the year ended December 31, 1934. It calls for returns "in so far as the information is readily available" regarding domestic apparatus connected to systems:—(a) Cookers; (b) water heaters (including immersion heaters in existing tanks); (c) wash-boilers; and (d) electric fires and other space heating apparatus (excluding water-circulating systems included under (b)).

Each return is to give total installations (number and kW connected), and, as a separate item, the number and kW connected of those appliances which are put out on hire or hire-purchase terms. The intention of this section of the returns is admirable and many undertakers have conscientiously provided these figures for the last five years. Yet, unless the writer is mistaken, no results have yet been made public. Does this mean that less public-spirited undertakings rely on the excuse of the figures "not being readily available." The industry has available records of the number of connected cookers, wash-boilers and water heaters; but these are submitted to and collated by E.D.A. Here is an obvious instance of wasteful overlapping.

A serious deficiency in the present return relates to industrial heating installations. No authoritative data exists regarding this increasingly important outlet for electricity. The writer has urged the Electricity Commissioners to consider an extension of the return asking for particulars of commercial and industrial heating connections upwards of 7 kW inclusive. The majority of such installations will have been connected in recent years. They have almost invariably formed the subject of separate negotiations with the consumer, and their existence is thus well known to the undertaker. There would certainly be no great difficulty in providing the information, and the propaganda value of steadily rising totals of connections would act as a first-class stimulus to sales in this important market. The appropriate heading in the return might be as follows:—

COMMERCIAL AND INDUSTRIAL HEATING APPARATUS connected to system (individual appliances under 7 kW to be neglected).

(a) Building warming (both thermal storage plant and direct electric heaters).

(b) Water (and other liquid) heating (including steam raising for process work, sterilising, etc.).

(c) Baking, cooking and fish frying.

(d) Industrial heat treatment (e.g., metal-melting, ovens, furnaces and kilns).

(e) Welders (both arc and resistance types).

In one further respect, finally, the return shows excellent intention, and hitherto only a partial result. There is a tantalising Section 2g headed "Total Power Load in Area." This calls for returns of:—(i) Load already connected; (ii) potential demand in industrial establishment already connected, including amount under (i); and (iii) potential demand in industrial establishments not already connected ..... kW.

Any returns made under heading (i) are presumably aggregated, with other figures for lighting and the domestic load, in the national "total of kW connected"; but with regard to (ii) and (iii) successive issues of the annual report of the Electricity Commissioners are strangely silent. These figures also are quite obviously "not readily available." In view of the importance of making a concerted drive to get more indus-

trial power load one wonders when some official stimulus will be given to those undertakers who are not sufficiently interested in load-building even to know what can still be got in their own areas.

Excellent service has been rendered to the electricity supply industry by the Board of Trade through its various Censuses of Production, which have been carried out for the years 1907, 1912, 1924, 1930 and 1935, and evidence has been obtained of the steady supersession of private works power plant in favour of public supply. In 1935 the Census showed that electricity supply undertakings provided 68.7 per cent. of the total electricity generated in Great Britain.

It is regrettable that in the 1935 Census details of the power equipment in factories and works were not required to be furnished, as they were in previous years. Before the next Census is carried out, as we hope it may be in 1940, representations should be made to the Board of Trade to persuade it if possible to include again a return which is of the greatest interest to the supply industry.

Sales Staff Data

Just one more comment on the Supplementary Statistical Return. Question 9 reads:—"Canvassing Arrangements: Are any arrangements in force for house-to-house canvassing? (Yes or No) . . . " The precise value of this information may be open to question; at any rate it is easy to supply. But it raises a much more important point. Success in sales development is very largely dependent on the size of the trained sales staff which is available to handle inquiries, and to establish personal contact with the public. One would like to see yet one more return (which also has the merit of being easily ascertained):—

SALES STAFF AVAILABLE.—State how many members of the staff are primarily engaged in selling electricity (or electrical appliances):

(i) Domestic applications ... ... Men..... Women.....
(ii) Commercial and industrial applitions ... ... Men.....

Total ... ...

A good deal might be said about the obvious waste of effort which exists at present due to overlapping, and the preparation of statistics which might, with a little more care in the drafting of the questionnaires, have been of far greater use than they actually are. More than once in recent years one has seen instances of two separate national bodies embarking on almost identical large-scale investigations of particular electrical applications.

Is it too much to hope that some day we may see the existing statistical department of the Electricity Commissioners elaborated so that it may form an authentic National Statistical Bureau for the electricity supply industry? The additional cost would be met by quite a small levy on the industry, and appreciable benefits would accrue to individual undertakers in a greatly reduced flow of unofficial "questionnaires." The possibility might at least be investigated by a small subcommittee whose terms of reference would be briefly:—

(1) To report on such statistical returns in regard to generation, distribution, and sales as are desirable, and which undertakers may reasonably be expected to furnish.

(2) To edit carefully all present and future questionnaires in order to avoid ambiguities and ensure that returns shall be strictly comparable.

This committee might be convened by the Commissioners and comprise representatives of the I.M.E.A., the Incorporated Association of Electric Power Companies (and kindred bodies), and E.D.A. Observations could be solicited from the Board of Trade, and particularly from such undertakings (the North-Eastern Electric Supply Co. is a conspicuous example) as have already experienced in their own organisation the benefits of a central statistical section.

Falsehoods and Inferences

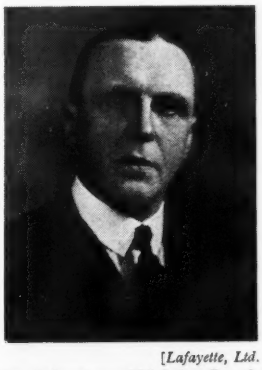
The *Spectator* recently had an article:—"Are Statisticians Liars?" in which occurred the words: "a number of most ingenious and plausible falsehoods can be based on statistics, but this feat is seldom performed by statisticians, who are for the most part precise and prudent men who put forward their results for what they are worth, without attempting to draw unjustified inferences." It is far from the writer's mind to suggest that "ingenious and plausible falsehoods" are uttered with intent by electricity supply engineers. It cannot be denied, however, that "unjustified inferences" are very frequently drawn from statistics which are superficially comparable, but which prove, on closer examination, to be based on different premises.

One has an uneasy feeling that an enormous amount of time is being wasted, in the aggregate, in the compilation of statistics which are of little value to the individual undertaking, and of no value to others owing to the lack of a common basis. How many returns are completed, and buried, year after year merely because "someone asked for the figures decades ago?"

The I.M.E.A. might consider as a title for a paper at the 1940 Convention "The Essential Statistics of an Electricity Supply Undertaking." A well-informed discussion on this subject might establish the urgent need for a committee of investigation on the lines suggested above.

New I.E.E. President

AT no time a sinecure, the office of President of the Institution of Electrical Engineers next session is likely to be even more arduous than usual. Apart from the normal activities entailed in guiding the evolution of the premier technical body of the electrical industry, representing some 20,000 members at home and overseas, the new President, Mr. Johnstone Wright (who takes office on October 1st) will bear a special burden—that symbolised by the national service register which the I.E.E. recently initiated—which is no less than to ensure that the Institution shall take its full share of responsibility for the country's preparedness for meeting any emergency. In all this the task of the President will certainly not be lightened by his being deprived of the ripe administrative experience of Mr. P. F. Rowell, the retiring General Secretary.



[*Lafayette, Ltd.*

Mr. Johnstone Wright, President-elect of the I.E.E.

In selecting Mr. Johnstone Wright as head of the Institution the Council has once more chosen wisely. As chief engineer to the Central Electricity Board, Mr. Wright occupies an exceptional vantage point for surveying the electrical needs of industry as a whole, while the leading part he plays in devising generating plant programmes and grid extensions, as well as in the control of the national pool of reserve equipment, implies an ability to exercise the foresight requisite to make his judgment effective.

Such work would in itself be enough to tax the energies of most people just now (albeit presidents, naturally enough, do tend to be chosen from those who are most actively engaged in other ways), but there will be no doubt whatever in the minds of those who know him that Mr. Wright will make time to shoulder his additional responsibilities with fortitude, since he possesses in full measure the qualities of determination and staying power traditionally ascribed to men hailing from north of the Tweed.

Born in Dunning, Perthshire, in 1883, Mr. Johnstone Wright was educated at Perth Academy and then at the Royal Technical College, Glasgow, in which city he served his time with Duncan Stewart & Co. After a couple of years as contracts engineer with the British Electric Plant Co., Alloa, he joined the staff of the Cleveland & Durham Electric Power Co. in 1905 in the capacity of construction engineer and, later, became power stations superintendent.

After fourteen years on the North-East Coast, he went to Bradford as deputy chief engineer and in 1922 he was appointed chief engineer and manager at Belfast where he remained until his appointment with the Central Board in 1927.

Mr. Wright has always taken a keen interest in Institution matters since he was elected an associate member in 1911. He was transferred to the membership grade in 1919, becoming a member of Council in 1933 and vice-president in 1936. He is also a member of the Institution of Civil Engineers.

His most notable contribution to the I.E.E. proceedings was in 1929 as joint author (with Mr. C. W. Marshall) of a paper on "The Construction of the Grid Transmission System in Great Britain," for which he was awarded the Institution Premium, but his remarks in discussions on other papers have always been distinguished by their thoughtful and constructive character. A more recent paper of his, not so easily obtainable, was on "The British Grid System," presented before the Engineering Institute of Canada in 1937.

In wishing Mr. Johnstone Wright every success in his term of office, his fellow members will earnestly hope that it may be one of peaceful progress also.

SEED POTATO STORAGE

A System Offering Constant Load Possibilities

FOUR and a half million tons of potatoes are grown in Great Britain every year. Of these, half a million tons are retained for the subsequent year's seed.

These potatoes have to be stored throughout the winter, but the method of so doing varies in different localities. The old system was to store the potatoes in clamps out of doors until after Christmas. This method is still used to greater or lesser degree, but in Lincolnshire there is a growing tendency to store the potatoes in glass houses heated for protection against frost, in which the potatoes are stored in trays any time after October.

Whether they are transferred to the trays immediately after lifting or later in the year after a period of storage in clamps, there is still a great potential electrical heating load. Hot water pipes fed by a coke-fired boiler, oil stoves, or in some cases gas fires are the usual methods of heating, but at Green Farm, Prickwillow, near Ely, where no public supply is available, Mr. T. H. W. Clarke has installed a private generation plant to heat his chitting (sprouting) house.

The house, which is constructed entirely of glass with a steel frame, measures 22 ft. wide by 150 ft. by about 15 ft. high, and serves a potato growing area of 350 acres. No special measures have been taken to ensure heat insulation, but when full the 300 tons of potatoes possess an inherent heat storage effect.

In this installation the power is supplied by a paraffin engine driving a 12-HP generator which feeds the heaters in the chitting house. There are thirty of these, fifteen on each side. They take the form of spirally wound firebars. These, of course, are radiant heaters and to avoid scorching the potatoes a semi-circular metal baffle cuts off direct rays, while asbestos plates afford further protection.

(*Photos by Callender's*)

Interior of the chitting house showing the arrangement of the heaters and trays

The installation is now about ten years old and has proved itself economical in use. Only one gallon of paraffin is used on an average per day to maintain the temperature at between 45 and 50 deg. F., and generally speaking it is not necessary to afford additional heating during the night, the thermal storage proving sufficient to maintain the temperature above 35 deg. F. until the following morning. Occasionally—one night, for instance, during last winter's severe frost—it is necessary to run the engine for a short period during the night.

The storage of potatoes in houses at a temperature of about 45 deg. F. enables them to grow short, sturdy shoots by April so that they will mature in from two to four weeks earlier after planting than usual. This time may, in a late season, be used for preparing the ground more thoroughly than would otherwise be possible, but is more frequently applied to obtaining an earlier crop.

A proportion of the September harvest—mainly small potatoes—is kept for seed. These potatoes after lifting are stored outdoors, until the frosts come, to become hard and green. It is then that they are brought into the chitting house and stacked in trays at a regulated temperature.

No doubt with a modern installation, embodying as it would thermostatically controlled low-temperature tubular heaters, considerable saving in energy could be effected, as compared with radiant heaters and hand control. This would be particularly important in a rural area where the electricity is obtained from a public supply.

It is essential that plenty of light should reach the potatoes in order to keep the shoots sturdy and short, and it was for this reason that glass was used for Mr. Clarke's chitting house. Where, however, heat conservation is an important problem in design, as it usually is with an electrical installation, a combination of glass and asbestos sheet would bring about a saving in running cost.

In comparing costs, however, it is important to remember, as Mr. Clarke has done, that a strict comparison between the cost of electricity and of coke fuel does not indicate the true position, for the latter needs almost constant attention in stoking, while the electrical method prevents overheating.

Mr. T. W. Chapman, the manager of the Prickwillow farm, told us that he had been frequently let down by the coke boiler due to its going out at night in frosty weather. Oil stoves need constant trimming, and it was found that the fumes had a detrimental effect on the potatoes.

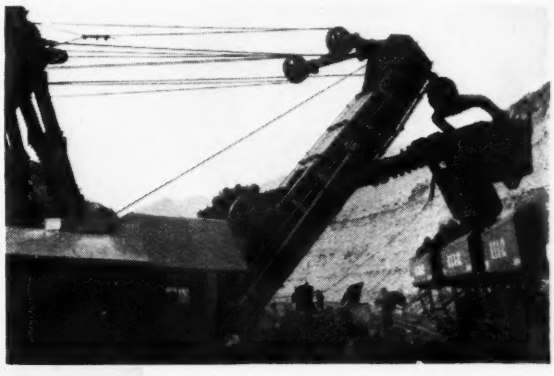
Although little has yet been done in this field it would appear to be a sound proposition for off-peak heating, especially if thermostatic control were incorporated.

IRON ORE MINING

New Plant at Irthlingborough

AN excellent example of modern methods of electric excavation, haulage, conveying, crushing and grading is now to be seen at Richard Thomas & Co.'s Irthlingborough iron ore mines, where the installation of an almost completely new plant is just nearing completion. Designed to supply the company's iron and steel works at Ebbw Vale with raw material, the undertaking, which extends over 3,000 acres, will shortly have an output of 18,000 tons of ore a week, or nearly a million tons a year. Of this, approximately 350,000 tons a year will be obtained from underground workings which have been in operation for some years, while a further 600,000 tons will come from a new open-cast working just being opened up at Finedon.

In the open-cast working the giant stripper (below) removes the top strata ready for the excavator (right) to load the ore into trucks



The underground workings consist of galleries from which the ore is blasted and hauled away by an underground electric traction system. Perhaps the most interesting feature of the new open-cast working at Finedon is a huge Ransomes & Rapier electric stripping machine equipped with 9-cu. yd. shovel. This machine is capable of excavating and discharging at a 120 ft. radius and 60 ft. high, and is a veritable power station. Its cab houses, in addition to the mechanical equipment, a 3,300-V motor-generator set driven by a 750-HP motor with generators giving 125, 250 and 500 V, DC for the swinging, hoisting and travel motions. Control by the Ward-Leonard system ensures speed and accuracy. The brakes are electro-pneumatically operated.

For the mining of the ore itself a smaller but similarly equipped excavator with a 200-HP main motor is employed. Its 3½-cu. yd. bucket is discharged into railway trucks which are hauled to the head of the receiving hopper of a primary crushing plant. This plant, constructed by Head Wrightson & Co., Ltd., crushes the ore down to 8 in. maximum size for transport to the Irthlingborough plant and comprises a double-roll Hadfield crusher fed by grizzley feeder and driven by a 200-HP motor. About 250 tons an hour can be handled by this machine. The output is taken by means of conveyors to bunkers of 200-ton capacity, whence it is gravity fed into 3-ton trams for haulage. The plant incorporates B.T.H. motors, the

An electric locomotive hauling a load of ore from the mines

wiring and control equipment being carried out by the Dalyte Electrical Co.

The haulage system is an extension of the scheme designed in the first place to serve the underground workings only, so that all the ore from the open-cast working has at present to pass through the mines to reach Irthlingborough. To draw the trams five 80-HP electric locomotives are available, two being American General Electric and three Greenwood & Batley. Fitted with two 40-HP motors series/parallel connected, each of these will haul forty-five fully loaded trams on the down grade of 1/200, representing approximately 150 tons. In addition to these there are eighteen battery driven locomotives (twelve being 2 HP by British Electric Vehicles and six 4.8-HP by Greenwood & Batley). These serve the gallery workings in the mines themselves which extend over approximately ten miles of track.

On arrival at Irthlingborough the loaded trams are disconnected from the electric locomotives and then taken as required to the crushing plant by an endless rope haulage system, operated by 50-HP motors. Two revolving tipplers (10-HP motors) each holding two trams, empty the ore on to a variable speed pan feeder driven by a 12½-HP, 900-RPM motor, the speed of which is regulated to prevent overloading of the crushers.

Crushing is carried out by two Jeffrey Diamond swing hammer crushers, each capable of handling 250 tons of ore per hour, or 350 tons per hour working together. The crushed ore is discharged on to a conveyor belt and transferred to the screening and secondary crushing plant. Before passing through this, however, the ore is screened into sizes above 1¼ in., this over-size being transported to Ebbw Vale for use in the blast furnaces. The residues below 1¼ in. are again screened to above ⅜ in., this material being used as hearth layer in the sinter plant.

The material below ⅜ in. is fed on to a high-speed conveyor, and at the point of discharge a flap separates the larger pieces, which are fed into a secondary crusher. The remainder falls behind and is fed into storage without further crushing. This fine material, together with the product of the secondary crusher are termed "fines," but they are separated at the crushing stage in order not to produce unnecessary dust. The crushers are driven by means of adjustable belt drives, the two primary crushing motors being 350-HP, 3,300-V slip-ring induction machines, running at 592 RPM, while the secondary crusher motor is a similar machine of 200 HP running at 730 RPM. These and other motors in the plant are of the English Electric Co.'s manufacture. The electrical contracting work was carried out by the Dalyte Electrical Co., acting as sub-contractors to Mitchell Engineering, Ltd.

Sintering, which is designed to reduce the mass of the ore and increase the iron content per given weight, is carried out by a Dwight Lloyd plant producing up to 900 tons of sinter per day. The plant consists essentially of a continuous chain grate 8 ft. wide, composed of a series of pallets, which form the links of the chain. This is driven by a 25-HP variable speed DC motor and the speed of the table may be varied up to 6 ft. per minute. On to this table is fed about 2 in. thick of hearth layer, consisting of about 2 in. depth of ⅜-in. crushed ore from the primary crushers, and on top of this a layer of about 8 in. of "fines" mixed with crushed coke.

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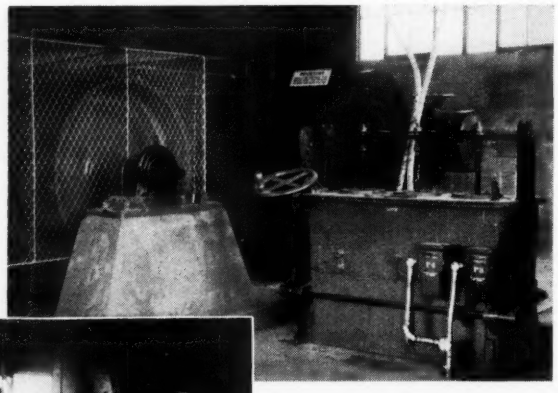
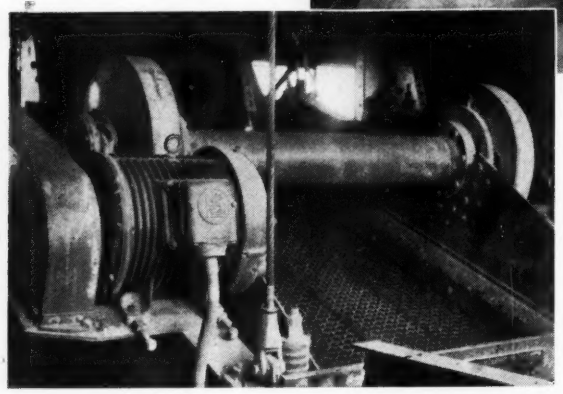
These materials are fed from their respective storage bins by feed tables and conveyors, the speed of which is directly controlled from a panel on the sinter machine floor. Small storage hoppers are provided above the sinter machine from which the materials are fed on to the bed. The thickness of the bed which is about 8 to 10 in. according to the speed is controlled by a gate immediately in front of the points of supply. The mixture then passes under a pressure oil burner which ignites the coke and so provides a fuel for reducing the burden to sinter.

Induced draught for the combustion is furnished by a Howden twin impeller fan, the capacity of which is 85,000 cu. ft. of air per minute at 24 in. water gauge, driven by a 500-HP, 970-RPM, B.T.H. synchronous induction motor which assists in power-factor correction of the system. The air is drawn through the sinter bed *via* a series of wind boxes into a gas main system and a battery of cyclones which collect dust before the waste gases pass way through the chimney. At the end of its travel on the pallets the sinter bed is broken and falls over the front end of the machine and discharges *via* a chute and hopper into a hoist skip which conveys the sinter to a storage bin.





One of the 350-HP crushing motors and (left) a vibrating screen for grading the crushed ore

An interesting feature of this plant is that a stoppage at any point automatically stops all operations behind it and so eliminates any possibility of congestion. The electrical contracting work was carried out by Marsh Bros., acting as sub-contractors for Huntingdon Heberlein. All the motors are of B.T.H. manufacture, the specially designed control gear being made by Wilfred Francis & Co., Ltd.

Power is provided by the Rushden and District Electric Supply Co., Ltd., at 11 kV, 3-phase, 50 cycles. The main switchboard (Ferguson Pailin) consists of five 11-kV, 250-MVA metal-clad vertical isolation units which control two incoming feeders, a feeder to the mines and open-cast workings and two transformers. The incoming power is metered by duplicate Landis & Gyr "Trivector" meters.

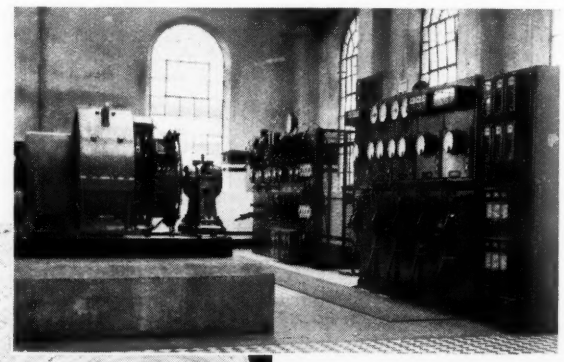
The two transformers are connected to a 3.3-kV switchboard of similar type, which controls two feeders to the crushing and sintering plant and a 250-kW motor-generator set. The switchboards, together with the motor-generator set and DC panels, are housed in the original steam power house, which was designed for supplying all the load for the mines and calcining plant of the old Ebbw Vale Iron & Steel Co. The calcining plant and the steam sets in the power house are being dismantled, but the DC switchboard has been re-employed for controlling the output from the 250-kW motor-generator set for distribution to the underground mine traction system and the sinter plant DC auxiliaries.

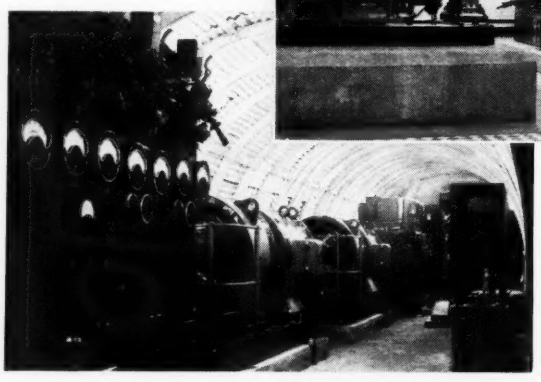
The two main transformers (Hackbridge) stand outside the power house on concrete rafts, surrounded by chippings and divided by a fire barrier wall. The duplicate feeders to the crushing plant are controlled by a further Ferguson Pailin switchboard in the primary crusher motor room, which distributes power direct to the crusher motors, the sinter fan motor and to a 500-kVA, 440-V transformer for AC auxiliaries.

The main AC supply to the mines and open-cast workings is distributed by an 11-kV overhead line about 2¾ miles long erected by Callender's Cable & Construction Co., Ltd., This line, which is of normal wood pole construction with 0.1 sq. in. 7/0.136 in bare copper conductors and a 7/12 SWG galvanised steel stranded earth wire, feeds three sub-stations each equipped with pole-mounted, air-break, drop-down, switch-fuse isolators connected to an outdoor transformer.

The first tapping point, about two miles from the main sub-station, is equipped with a 500-kVA transformer stepping down to 3.3 kV and a metal-clad 3.3-kV switch housed in a brick-built kiosk. From here a 3.3-kV cable runs into a sub-station situated in the mine galleries. This sub-station boosts the underground haulage trolley system supplied from the power station at Irthlingborough and contains two 150-kW motor-generator sets, supplying 250 V. DC to the trolley wires, and one 100-kW set for charging the battery locomotives. The motor-generator sets (English Electric) are controlled on the high-voltage side by a further Ferguson Pailin 3.3-kV metal-clad switchboard and on the low-voltage side by an English Electric DC switchboard.

The second tapping point on the 11-kV line is 2¼ miles from the main sub-station and is equipped with a 1,000-kVA transformer stepping down to 3.3-kV for supplying the open-cast working. From here a 0.1-sq. in. 3-core p.i.l.c.d.w.a. cable runs out to the quarry face and is tapped by tee-off mining type switches, to which can be connected 4-core flexible trailing cables with 0.1-sq. in. conductors for supplying the power to the digger and stripper. The trailing cables are protected by the core-balance system. The furthest point on the transmission line feeds the crushing plant at Finedon and is equipped with a 500-kVA transformer stepping down to 440 V.





The power house and (left) the bore-hole sub-station

The system is completed by systematic correction of the power factor at the centres of supply, *viz.*, the power station, crushing and sinter plant, mine sub-station and the quarry.

We wish to thank Richard Thomas & Co., Ltd., together with H. A. Brassert & Co., Ltd., consulting engineers, for their assistance in compiling this article.

Finnish Anti-Interference Move

FOLLOWING recommendations made by a Commission under the chairmanship of Professor B. Wuolle all lifts in Helsinki are to be equipped with noise suppressors. Special efforts are now being made to suppress interference from trams, electric trains and trolley-buses, and a leaflet explaining the nature and cause of all known radio noises, as well as suggesting means of eliminating them, is being distributed to listeners free of charge.

EXCAVATION BY PUMPING

The "Wet" Method of Handling Shingle and Sand

ANYONE who has visited the middle reaches of the Thames, particularly round about Chertsey, Shepperton and Walton, must have noticed the various expanses of water, looking like natural lakes or reservoirs, close to but not actually connected with the river. Sometimes they are as much as 40 ft. deep and often are so large that one fails to observe on the banks a ballast works, where shingle, gravel and sand are produced. Yet when these works were started the adjacent land was quite dry, the water having accumulated as the result of the system of excavation employed.

This "wet" method of excavation as it is called, is being adopted more and more extensively all over the country in localities where conditions are suitable, namely where water is rapidly reached on digging. A few days ago we had an opportunity of seeing how efficiently the system works when the help of electricity is utilised. The works we visited were those of W. J. Lavender, Ltd., in Littleton Lane, Shepperton-on-Thames, where the equipment is virtually all-electric.

To give some idea of the reduction of labour effected there by using electricity, Mr. A. C. Allen, the manager, mentioned that only twenty-five men were needed for a production of 2,000 yards of material a day. For this output 50,000 kWh of electricity a month is consumed, a very reasonable charge being made for it by the Woking Electricity Supply Co., Ltd., under a maximum demand rate of £3 15s. per annum, plus a "unit" charge of ½d. Last year the m.d. was 352 kVA.

The first stage is sucking up the ballast (the raw mixture of shingle and sand) from the bed of the lake through 8-in. metal tubes. For this two pontoons or rafts are used on each of which is a pump, belt driven by a 60-HP, 730-RPM slipring motor. The ballast is discharged from the pontoon *via* further 8-in. pipes on to unsinkable water jet propelled barges which are brought alongside. Raising or lowering of the ballast pipes is undertaken by means of friction hoists driven by 5-HP, 930-RPM squirrel-cage motors. Three barges are provided for each pontoon (one loading, one unloading and the third in transit) and it takes about twenty minutes to load each barge to its capacity of 50 yards. Approximately the same time is taken to unload at one of the two almost identical shore stations. Here, before the ballast is sucked out of the barges, water is pumped in, by means of a pump driven by a 35-HP, 960-RPM, slipring motor, to render it sufficiently liquid.

The pumping plant employed for the actual unloading is similar to that used on the pontoons but, owing to the fact that a considerable head is required to raise the ballast sufficiently high to enable it to be dealt with by the screening plant, is rather more powerful, 100-HP, 730-RPM, slipring motors being used for operating purposes. The friction hoists for raising and lowering the 8-in. piping are here too driven by 5-HP slipring motors, operating at 930 RPM, while further 5-HP motors working at 1,430 RPM drive flushing pumps for priming the pumping system, as well as for cooling the pump bearings.

From one shore plant the ballast is delivered straight to a "boiling box" where all stones over 1½ in. are removed and taken away by conveyor to a crushing plant. The ballast

Above: Pumping water into a barge to render the ballast sufficiently liquid for sucking out. Another full barge waits off the landing stage. Left: Sand passes through a "launder" to a pit, whence a pump conveys it to sand cones or classifiers to grade it into two sizes

which passes through this first screening is washed by means of flume pumps (20-HP, 570 RPM motors) and then can be gravity fed by means of hoppers directly into lorries beneath.

From the other shore plant, the ballast is delivered into another boiling box which discharges on to an electric vibrating screen, driven by a 10-HP, 940-RPM motor, which rejects all stones over 1½ in. This rejected stone is also conveyed to the crushing plant. The remaining material is then conveyed to a second electric vibrating screen, driven by a 10-HP, 940-RMP motor where it is graded into three natural sizes. The material over 1½ in. is broken up in a 4-ft. Symonds cone crusher (for which a 110-HP, 960-RPM, slipring motor is used) and back on conveyors to be graded, also into three sizes; for operating the screens 10-HP 960-RPM motors are used. Flume pumps remove the sand.

Conveyors take the material over 1½in. to be broken up in a 4-ft. Symonds cone crusher

The six grades of materials (three sizes of natural and three sizes of crushed) are carried up by six parallel lines of conveyors (two 3-HP, 920-RPM motors; two 5-HP, 710-RPM; and two 7½-HP, 720-RPM) running to hoppers, which deliver direct to lorries beneath. When the hoppers are full, reversible conveyors can be brought into service for taking shingles to the store ground and these conveyors can also be used for making up various "aggregates" or mixtures required by customers. The sand, which is extracted by flume pumps, is washed and taken through a "launder" or tube to a pit 20 ft. cube, whence a pump, driven by a 36-HP, 720-RPM slipring motor, conveys it to sand cones or classifiers to grade it into two sizes.

As the electricity supply is at 400 V, 50 cycles, single-phase, the Ferraris-Arno system has been adopted for the majority of the motors. Single-phase motors are, however, used for the main pump in the shore plant and on the pontoons to

avoid running three-core cables out to the latter and to eliminate possible inconveniences concerned with the sequence of starting. The remaining motors on the shore plant operate on the Ferraris-Arno system, the hoist motor being the pilot.

Another pilot motor driving the three-deck screening plant serves a second Ferraris-Arno system embracing the screening plant, crusher and sand pump that is tied-in with the first system. Extreme flexibility of operation has thus been obtained.

A 200-kVA static condenser has been installed to improve the power factor (in view of the maximum demand basis of charging) of the original equipment installed some three years ago comprising one pontoon, one shore plant, screening plant, crusher and sand pump. On the later plant, however, capacitor start and run motors have been employed to secure at once the necessary starting torque and power factor correction.

All the pumping plant was supplied by Gwynnes Pumps, Ltd., and practically all the motors used were made by the Fuller Electrical and Manufacturing Co., Ltd., and have Fuller, Allen West, Erskine Heap, Ellison or Acme starters. The equipment of the main switch room was made by the Airedale Electrical Manufacturing Co. there being, besides the main switch, separate circuit breakers for the shore plant, screens, crusher plant, water and sand pump and pontoons. As there is a restricted supply in the winter a Venner time switch is employed to operate a horn as a warning at the appropriate times. The electrical installation was carried out by the City Electrical Co., Ltd.

Fatal Shock from Earthing Plate

Question of Liability

AT Northants Assizes last week, Kettering Urban District Council (as the authority then was) and Brixworth Rural District Council were joint defendants in an action arising from a fatality of unusual character at Oxendon in August, 1937. Plaintiff was the widow of Cecil Arthur Reynolds, of Desborough, who received a fatal shock when cutting grass at the rear of his father's house.

Mr. Rawlins, for plaintiff, said that deceased, who was 28, was cutting grass in the garden of his father's house when the accident occurred. His father had been tenant of the house for five years, and electricity had been installed in 1931 by Oxendon Council, predecessors of Brixworth Council. The earthing was by means of an iron bar or pipe inserted in the earth, to which were attached bare copper wires, and it was by contact with these wires that Reynolds was killed. The case against Brixworth Council was that there was negligence in the earthing arrangements in that the earthing plate should have been inserted vertically in moist earth or earth that was likely to be moist, but was in fact placed horizontally a few inches in dry earth. Reynolds was found by his father with his hand grasping the bare wire, and he was dead.

In August, 1936, deceased's father had a hot-plate installed by a Mr. Bale, and it was alleged that this work was negligently done in that the switch carrying the supply to the hot-plate was put in the neutral instead of the live wire and that this made the system defective and there was a leakage. The Kettering defendants, who supplied the electric power, were called in to repair the hot-plate and the allegation against them was that they failed to discover the defective state of the installation when carrying out these repairs.

Mr. J. Reynolds, the father, said he could not recall anybody inspecting the electrical installation during his tenancy.

Mrs. Reynolds, mother of deceased, said she received permission from the rate collector to have the alteration to the electrical installation carried out and got Mr. Bale to do the work. When the plate was delivered the person who brought it told her that the installation was not correct, and he saw Mr. Bale as to what needed doing. The work was completed and the plate connected up, but she did not know if there were any further examination of the wiring. In cross-examination, Mrs. Reynolds declared that when she spoke about having the hot-plate, she also mentioned a greenhouse. She knew that all the Kettering Department had to do was to plug the wiring for the plate. It was Mr. Pettifer (a clerk in the Market Harborough offices of Kettering Electricity Department) who brought the plate. She used the hot-plate to boil milk at night, and it was only later that she found that she could do this on the outside of the plate even though the centre was defective.

Contractor's Evidence

Mr. L. W. Bale, a mechanical and electrical engineer now in business at Northampton, said that when he had done the wiring he asked the suppliers for a test, and was told he would have to fit a switch-fuse and a three-point switch-plug. He got the materials from the Market Harborough office of the Kettering Electricity Department and told them that the work would be ready for a further test the following day. In cross-examination, he said he was at Oxendon for five or six years, worked single-handed, and would not describe himself as an expert in electrical work. He did not test the hot-plate as he had not the equipment. He denied that he never sent a test notice to the Kettering authority. He admitted that he had put the switch in the neutral instead of the earth and that that would have the effect of keeping the wires live. If the earth plate was correct and there was a leakage the fuses would be blown, and there would be no damage.

Mr. H. G. Sharp, of London, who stated that he had supervised 5,000 installations in one year, said there were three faults —the defective earthing system, the defective hot-plate, and the defective switch, and he put them in that order, the switch making no real difference. Shown the earthing plate, he said it should have been longer, should have been placed vertically, and should have been so placed as to receive moisture. It should have been of non-ferrous material, but was of iron, was corroded, and in dry soil would be absolutely useless. It was compulsory for suppliers to test an installation before it was operative, and in his view when a new tenant took over the premises it was proper to have a new test.

Mr. R. C. Vaughan (for Brixworth Council) suggested that he was wrong in the theory on which he was giving evidence. Mr. Sharp replied that if he were wrong 30,000 engineers in the country must be wrong.

Mr. Vaughan argued that Brixworth Council could not be liable. His first point was that a landlord not in occupation could not be held liable to a guest. The Brixworth Council, he contended, was under no obligation to maintain, neither could the Council be regarded as liable, in a case where liability only arose when damage was done, and that damage occurred after the transference and after the appointed day of transference.

Mr. Flint also submitted that the case against Kettering Council must fail on the ground that there was no liability to third parties, and that the father had actually contracted out of liability by the signature to the agreements with Kettering Council.

With this proposition, Mr. P. L. E. Rawlins (for plaintiff) disagreed, and the Judge (Mr. Justice Oliver) took the view that the contracting out could not destroy the visitor's rights. His Lordship said there was evidence of negligence, but the question was what was the duty of the defendant authorities to the dead man.

After hearing further arguments from Mr. Rawlins the Judge said that so far as he could see there must be judgment for defendants with costs, but he would not deliver his actual judgment that day, as the wording of it would need very careful consideration. He intimated that he would deliver judgment in London at a later date.

The Engineers' Guild

BULLETIN No. 1 issued by the Engineers' Guild contains an account of the first meeting held in February last at which the membership was stated to have grown to 200 since the Guild's inauguration a year ago; there are a few members overseas. A London branch is being formed, with Mr. W. A. M. Allan, 155, Camden Road, N.W.1, as hon. secretary, pending the federation of branches of equal status in all parts of the country. Its objects are not intended to clash with those of the Institutions, which are concerned with engineering, whereas the Guild concerns itself with engineers in order that the interests of the profession may be protected and that the profession may be enabled to exercise the influence in public affairs to which its important place in the national life entitles it.

The first annual general meeting of the Guild was held at Westminster, on May 24th, with Mr. Robert Chalmers in the chair. The guest of honour of the evening was M. Bouquet, secretary of the Syndicat Professionel des Ingénieurs Diplomés Francais, which has aims and objects very similar to those of the Guild. The principal business before the meeting was the adoption of the new permanent constitution and by-laws, the preparation of which was imposed upon the Council at the inaugural meeting in May last year. Under the new constitution the qualification for membership remains unchanged, namely, corporate membership of the Institutions of Civil and Mechanical Engineers, Naval Architects and Electrical Engineers, but there is provision for enlarging the scope of membership at a future date. In addition, a class of associates has been created, which is open to graduates of a British university, students and/or graduates of the four Institutions and matriculated students of a British university who are pursuing a course leading to a degree in engineering. The annual subscriptions for members and associates are one guinea and half a guinea, respectively.

PERSONAL AND SOCIAL

Information regarding new appointments and other matters of interest for this page are welcomed

THE Bath and West Agricultural Show which was held recently at Bridgwater attracted a large attendance, and on May 24th, the opening day, the electrical display was responsible for the presence of a number of well-known electrical men, including Messrs. H. Walker, engineer and manager

At the Bath and West Show. (Top) Messrs. E. W. Tole and H. W. Knapp. (Below left to right) Messrs. H. Walker, G. J. Hollyer and W. C. Bowler

to the Bridgwater Electric Supply Co., Ltd.; G. J. Hollyer, manager of the Torquay Corporation Electricity Department and chairman of the S.W.E. and S.W. (Southern Division) of E.D.A.; W. C. Bowler, electrical engineer to the Warmley R.D.C.; H. W. Knapp, general manager of the West Devon Electric Supply Co., Ltd.; and E. W. Tole, general manager and secretary of the North Somerset Electric Supply Co., Ltd.

Mr. J. S. Pickles, B.Sc., M.I.E.E., chief engineer of the Dumfries County Council electricity undertaking, was recently appointed chairman of the Scottish Centre of the I.M.E.A. for the ensuing year, and the area's representative on the I.M.E.A. Council.

Mr. D. Ross, A.M.I.E.E., deputy electrical engineer to the Dumfries County Council, has been appointed burgh electrical engineer and manager at Paisley. Mr. Ross received his practical training with Kilmarnock Corporation Electricity Department and his theoretical training at Kilmarnock Technical School and Dundee Technical College. He has held the successive appointments of assistant mains engineer with the Kilmarnock and Dundee Electricity Departments and with the Ayrshire Electricity Board, distribution superintendent with the Aylesbury Corporation, and mains construction engineer with the Yorkshire Electric Power Co. Since joining the Dumfries County Council he has taken an active part in the design, construction and development of the Dumfriesshire electricity distribution scheme. He is also the designer of several fittings used in connection with transmission and distribution. Mr. Ross has contributed several articles to the technical Press and in 1935 was awarded the Sebastian de Ferranti Premium by the Council of the I.E.E., for a paper on rural electrification.

Mr. D. Ross

Greenock Corporation, on June 2nd, appointed **Mr. W. S. Kelly,** B.Sc. (Eng.), of Dundee, as mains superintendent of the Electricity Department. Mr. Kelly has been distribution superintendent to Dundee Corporation Electricity Department for some time. He formerly held posts with Dumfries County Council and Glasgow Corporation. He is an associate member of the Institution of Electrical Engineers and a past chairman of the Electrical Power Engineers' Association, Northern Section.

Mr. E. B. Moullin, M.A., has been elected chairman of the Wireless Section of the Institution of Electrical Engineers for 1939-40.

Mr. E. A. Dymond

Mr. E. A. Dymond, general sales manager of Sangamo Weston, Ltd., has been appointed a director of the company. **Mr. F. R. Butherus,** secretary and chief engineer and **Mr. W. G. Bush,** chief accountant, have also been appointed directors.

Miss V. Swarbrick, daughter of Mr. F. Swarbrick, borough electrical engineer of Hove, was married at St. Barnabas Church, Southfields, on May 27th to **Mr. J. T. Saunders.** Miss Swarbrick is chief demonstrator for the English Electric Co., Ltd., and Mr. Saunders is a member of the London sales engineers' staff of Johnson & Phillips, Ltd., specialising in the development of electric water heating in London and the provinces.

Mr. G. Cox, A.M.I.E.E., who was mains superintendent to the Brompton and Kensington Electricity Supply Co., Ltd., (now incorporated in Central London Electricity, Ltd.,) has retired. He began his career in the electricity supply industry in 1899 with the Cardiff City undertaking and joined the B. & K. Co., as installation engineer and meter superintendent in 1903. Later he became assistant mains superintendent and in 1919 was appointed mains superintendent. This was one of the original companies supplying AC on the house-to-house transformer principle, the supply being generated at 2,000 V, single-phase, originally at 83 cycles. The company was one of the pioneers of domestic electrification and certainly one of the first to install rising mains in consumers' premises. Mr. Cox played a large part in the distribution side of this work, together with the change of frequency to 50 cycles which took place in 1928, and the closing down of the old generating station when a supply was received from the London Power Co. at 22,000 V. The last fundamental change with which he was connected was the change-over of the distribution voltage from 100 to 230 V, now well on its way towards completion. In 1936 the company became one of the group which is now known as Central London Electricity, Ltd., and Mr. Cox's last few years have been spent in much of the co-ordinating work that such grouping entails.

Mr. G. Cox

Mr. W. H. Le Marèchal, whose retirement was briefly announced last week, joined the staff of Siemens Bros. & Co.,

Mr. W. H. Le Marèchal

Mr. P. D. Oakley

Ltd., in July, 1908, as manager of the lamp works, at Dalston, a works which he started for the purpose of manufacturing tantalum lamps. Among other things for which Mr.

Le Marèchal was responsible was the introduction of the traction type tungsten lamp designed to take the place of the tantalum lamp, which had previously been used for this purpose on account of its robust character, and the tungsten filament traction lamp invented by Mr. Le Marèchal is in use in large quantities to-day. In 1923 the lamp factory was moved to Preston, where increased manufacturing facilities were available. The factory has been extended from time to time to meet with the increased demand in the types and quantities of lamps and in all these developments Mr. Le Marèchal has played a prominent part. He is relinquishing his post as manager of the factory on reaching the retiring age, but will continue to act in a consultative capacity for a further period.

Mr. P. D. Oakley, B.Sc., F.I.C., who succeeds Mr. Le Marèchal, was trained at King's College, University of London, and graduated with first-class honours in chemistry in 1914. In 1915 he joined the staff at the Dalston lamps works to undertake research in the production of tantalum, which had not hitherto been produced in this country, and with the late Mr. Alexander Siemens he succeeded in producing pure fused tantalum early in 1916. Mr. Oakley established the manufacture of drawn tungsten wire for Siemens and continued as works chemist with responsibility for wire manufacture and other chemical matters connected with lamp making. He was transferred to Preston in 1923 when the lamp interests of Siemens Bros. & Co., Ltd., and the English Electric Co., Ltd., were merged. From 1925 onwards he was chief chemist to Siemens Electric Lamps and Supplies, a subsidiary of Siemens Brothers & Co., and has been actively associated with recent developments in electric-discharge lamps. He was appointed assistant works manager in 1936. Mr. Oakley has represented the Siemens lamp works for some years on various technical committees.

As our readers are aware **Mr. P. F. Rowell** is about to retire from the secretaryship of the Institution of Electrical Engineers, and it is felt that the occasion affords a fitting opportunity to express, by means of a testimonial, appreciation of his work for the Institution during the past thirty years. The Council suggests that each contribution should not exceed 2s. 6d. A small committee is being set up to make the necessary arrangements and contributions should be sent to Dr. A. P. M. Fleming, the president, c/o of the Institution, Savoy Place, Victoria Embankment, W.C.2, not later than June 24th.

A pleasant ceremony took place at the works of the Hackbridge Electric Construction Co. and Hewittic Electric Co., at Walton-on-Thames on June 1st, when a presentation was made on behalf of all the employees of the two companies to **Mr. W. W. Hughes,** M.I.E.E., chairman and managing director, in celebration of his completion of fifty years of business life. The presentation, which was made by Mr. T. F. Lister, works director, took the form of an inscribed gold cigarette case. Present at the ceremony were also Mrs. W. W. Hughes, Mr. C. Penn Hughes, Mr. T. F. Lister and Mr. R. G. Jones, directors, and Mr. A. M. Browne, manager of the Hewittic Co., together with the whole of the works' employees.

Mr. and Mrs. W. W. Hughes

In making the presentation Mr. Lister gave an account of Mr. Hughes' long association with the electrical industry, commencing in 1889 in South Wales, where he was born, and including service with Messrs. Cromptons, the British Westinghouse Co. (he became manager of the company's largest department), and as a consulting engineer in London and subsequently in Swansea, in partnership with Mr. R. G. Jones. In 1918 Mr. Hughes again entered the manufacturing field by negotiating the purchase of the New Switchgear Co., of Sutton. A further advance in this connection was made in 1923 with the inauguration of the Hackbridge Electric Construction Co., manufacturing transformers first at Hackbridge and soon afterwards in a larger factory on the present site near Walton-on-Thames. In 1924 Mr. Hughes took an interest in the Hewittic Electric Co., then operating at King's Cross, and in 1925 that company's manufacture was transferred to Walton-on-Thames. Mr. Hughes suitably responded.

The date fixed for this year's Dick, Kerr Reunion is June 16th, at 7.30 p.m. for 8 o'clock, at the Holborn Restaurant, London, W.C.2. Ex-Dick, Kerr men intending to be present should advise Mr. R. Briggs, 36, Kingsway, W.C.2., not later than June 14th.

Mr. R. C. Graseby, managing director of Venner Time Switches, Ltd., was married on May 25th to Miss A. Barton.

Major L. J. Westbury, formerly with the General Electric Co., Ltd., for twelve years, has been appointed to represent the Yorkshire Switchgear and Engineering Co., Ltd., in the Eastern Counties area. Major Westbury will also take an active interest in the products of the associated company Transformers & Welders, Ltd., of Watford.

Mr. J. R. Jones, M.I.E.E., deputy chief engineer of the Battersea Borough Council electricity undertaking, has been appointed chief electrical engineer to the Hammersmith undertaking in succession to the late Mr. A. F. Harmer. Mr. Jones received his general education at the Higher Grade School, Colwyn Bay, and Monmouth Grammar School, and his technical education at Armstrong College, Newcastle-on-Tyne, and the Technical College, Sunderland. His technical training was obtained with O'Brien & Co., Manchester, over a period of two years and he was a premium pupil to the borough electrical engineer, Monmouth Corporation, for one year, followed by a two years' special training course for junior engineers with the Newcastle Electric Supply Co.

[*Elec. Rev.* photo.
Mr. J. R. Jones

On completion of his training with the Newcastle Co. he was appointed to the staff and remained with the company for eighteen years, during which he obtained a wide and varied experience of all matters relating to electricity supply and held the senior position of distribution engineer for five years over an area of approximately 100 sq. miles of the company's system in the County of Durham. He also held the position of senior charge engineer for a period of about two years at the Dunston power station which at that time had a capacity of about 75,000 kW and was one of the largest in the country. In 1926 he entered the service of the Newport (Mon.) Corporation as station superintendent and remained there until 1930, when he was appointed chief assistant engineer to the Watford Corporation. In July, 1934, he was appointed deputy electrical engineer to the Hammersmith electricity undertaking, with whom he remained until July, 1936, when he took up his present position at Battersea.

On page 841 we give brief biographical notes of **Mr. Johnstone Wright,** who has been nominated for the presidency of the Institution of Electrical Engineer for the session 1939-40. The following gentlemen have also been nominated to serve upon the Council:—Col. A. S. Angwin, D.S.O., M.C., Engineer-in-Chief of the G.P.O., has been nominated as vice-president, and Mr. W. McClelland, C.B., O.B.E., a director of W. T. Henley's Telegraph Works Co., Ltd., and other companies, as hon. treasurer.

The ordinary members of the Council are:—*Members*: Mr. E. S. Byng, vice-chairman of Standard Telephones & Cables, Ltd.; Mr. H. J. Cash, chairman of H. J. Cash & Co., Ltd.; Mr. P. Good, Deputy Director of the British Standards Institution; Prof. W. J. John, B.Sc. (Eng.), Professor of Electrical Engineering at Queen Mary College; Mr. A. L. Lunn, Electrical Engineer (Generation), London Passenger Transport Board; Mr. H. W. Swann, H.M. Senior Electrical Inspector of Factories, Home Office, Electrical Branch. *Associate Member*: Prof. W. Jackson, D.Sc., D.Phil., Professor of Electro-Technics, The University, Manchester. *Associate*: Mr. D. Z. de Ferranti, director, Ferranti, Ltd.

Mr. F. Wain, managing director of the Britannia Tube Co., Ltd., has been elected president of the Birmingham Chamber of Commerce in succession to the Earl of Dudley. The Chamber is responsible, in association with the Department of Overseas Trade, for the Engineering and Hardware Section of the British Industries Fair, and Mr. Wain has already served as honorary treasurer of the Birmingham Chamber and of the Birmingham Section of the Fair.

At the annual meeting of Ayrshire Electricity Board at Kilmarnock, **ex-Bailie Thomas Murray,** Ayr, was appointed chairman. **Ex-Bailie J. M. Bryce,** who had been chairman for the past three-and-a-half years and who did not seek re-election, was thanked by the new chairman for the valuable services which he had performed during his term of office.

OBITUARY

Sir Henry Norman, whose death on June 4th, at the age of eighty, is announced, was a pioneer in radio telegraphy, and in 1920 was chairman of the committee which drew up a complete wireless scheme for the British Empire. His services to wireless telegraphy led to his becoming a vice-president of the Radio Society of Great Britain, a fellow of the Physical Society and of the American Institute of Radio Engineers, and at one time he was an associate of the I.E.E.

The "Thetis" Disaster.—We regret to record that among the ninety-nine people who lost their lives in the submarine *Thetis* were **Mr. L. W. Hunn,** B.Sc., electrical engineer, Admiralty, and **Mr. W. H. Aslett,** an Admiralty assistant electrical overseer.

Mr. Leslie William Hunn, who was twenty-eight, entered Admiralty service as an assistant electrical engineer, in Janu-

Trolley-buses at Brighton

Increased Revenue

UNDER the Brighton Corporation Act, 1938, powers were obtained to abolish the tramways and construct a modern transport system with extensions for trolley-buses and motor-buses in conjunction with other local passenger transport operators. Provision was made for a loan of £354,000 to cover the cost of the scheme, including the equipment of 15 miles of trolley-bus route. As there were only 9½ miles of tramway route it will be seen that the Act foreshadowed an extended electric transport system. Subsequently, contracts were placed for equipping 10 miles of trolley-bus route and a few weeks ago the first section was brought into operation.

It is interesting to recall that the Brighton Corporation obtained its first powers for operating passenger transport services in the form of tramways in 1900, and the first tramway route was opened in November, 1901. Further powers were obtained in 1902 and 1903 for extensions. The original loan for construction of the tramways was £300,486; capital expenditure to the end of 1904 was £274,905, when 50 tramcars were in operation. During the last 20 years the number of cars owned by the undertaking has increased to 80, and the capital expenditure to date is approximately £320,000.

Last week the new system was officially inaugurated when the Mayor (Councillor J. Talbot Nanson) in the presence of a large crowd outside the Aquarium opened the Ditchling Road and Beaconsfield trolley-bus route with an extension to Hollingbury. At the close of the brief ceremony members of the Council, officials and guests were taken over the route, the first vehicle, decorated for the occasion, being driven by Councillor E. Sims, chairman of the Transport Committee.

The tour was followed by an inaugural luncheon at the Dome, when Councillor Sims presided. Reviewing the recent history of the undertaking, Councillor F. G. Field, chairman of the special committee which dealt with the negotiations and also chairman of the Electricity Committee, said that they had at last reached some measure of order out of chaos. He referred to the negotiations with the Brighton, Hove and District Co. and the eventual partnership now in active operation with regard to the change from tramway to trolley-buses. He said that traffic returns justified the step which had been taken.

Inauguration of the new transport system at Brighton

Councillor Sims, in reply, mentioned that the Corporation had promoted several previous trolley-bus Bills, and he himself had wanted trolley-buses for seven or eight years. From the delay they had, however, reaped an advantage in that the vehicles had been vastly improved. In regard to the overhead equipment, he said that they had visited Reading and come back with changed ideas. The equipment now provided was light and certainly not excessively obtrusive.

The toast of "The Contractors" was proposed by Alderman H. J. Galliers, who first congratulated the Corporation's transport manager (Mr. Winston Robinson) on the excellence of the specifications and the way in which the work had been carried out. The vehicles were constructed by the Associated Equipment Co., with electrical equipment produced in the borough by the Crompton-West organisation and bodies by the Metropolitan-Cammell-Weyman Motor Bodies, Ltd. It was noteworthy, he said, that the vehicles had been delivered before the scheduled time. Clough Smith & Co. were responsible for the overhead equipment. The toast was replied to by Mr. A. S. Chattey (A.E.C.). The Mayor proposed "The Visitors," to which Mr. Justice Cassels replied.

Obituary (*Continued from opposite page*)

ary, 1937, being placed first in his batch of entries. He was educated at King Edward VII Grammar School, Norwich, and at the City and Guilds (Engineering) College, London University. He obtained a diploma of the City and Guilds of London Institute and a B.Sc. (Eng.) degree with honours. His practical engineering experience, prior to entering Admiralty service, was obtained with Laurence, Scott Co., Ltd., Norwich, and he was subsequently engaged in the company's marine department at London as assistant to his father, Mr. J. A. Hunn, who is a director of the company. He was married, in December, 1937, to Miss F. Batty. Our readers will wish to join us in extending our sympathy to his wife and to Mr. and Mrs. Hunn in their great loss.

Mr. William Henry Aslett had been engaged on Admiralty work at Cammell Laird & Co.'s shipyard since 1915. He leaves a widow and two grown-up children.

Sir Arthur N. L. Wood, Bt.—We regret to announce the sudden death of Sir Arthur Nicholas Lindsay Wood, Bt., of the Hermitage, Chester-le-Street, Co. Durham. While playing golf at St. Andrews on June 1st, Sir Arthur, who was sixty-four years of age, collapsed and was taken to his hotel, where he died shortly afterwards.

Sir Arthur was chairman of A. Reyrolle & Co., Ltd., Hebburn-on-Tyne, having been a director of the company since its incorporation in 1901, and was a director of the Newcastle & District Electric Lighting Co., Ltd. By profession he was a mining engineer, and he held the posts of mining agent to the Ecclesiastical Commissioners and mining surveyor for the County Palatine of Durham.

The late Sir Arthur Wood

Mr. C. A. Hazeltine, A.M.Inst.C.E..—We learn with regret of the death of Mr. Charles Albert Hazeltine, director of G. P. Cosway, Ltd., of Nuneaton, at the age of fifty-eight years. He was formerly with the Stepney Borough Council and from 1917 to 1927 he was with the Metropolitan-Vickers Electrical Co., Ltd., handling motor control gear. From 1928 till 1934 he was with the English Electric Co. in a similar capacity, and since 1934 he had been with G. P. Cosway, Ltd.

Mr. F. W. Campion.—We regret to announce the death of Mr. F. W. Campion which occurred on May 31st, at his home at 101a, Eltham Road, Lee, S.E., at the age of forty-four years. Mr. Campion joined Johnson and Phillips, Ltd., as manager of the switchgear and transformer departments in January, 1934, and by reason of his varied associations in the industry was very widely known. His apprenticeship was served in the switchgear department of Ferranti, Ltd. Later, he joined the General Electric Co., Ltd., at Witton, and from there he went to Siemens Bros., Dynamo Works, Ltd., at Stafford (now English Electric Co., Ltd.), where he was chief draughtsman in the switchgear department. His later experience with Crompton Parkinson, Ltd., at Chelmsford was prior to his service with Johnson & Phillips. He served with the Royal Engineers in France during the war.

The late Mr. F. W. Campion

Wills.—Mr. Francis James Walsh, formerly a director of the Macintosh Cable Co., Ltd., of Derby, left estate of the gross value of £38,338, with net personalty £37,310.

Mr. E. Lefeaux, manager of the North Woolwich works of W. T. Henley's Telegraph Works, Ltd., left £27,301 (net personalty £26,664).

COMMERCIAL AND INDUSTRIAL NEWS

Vitreous Enamellers' Conference. Transformers for New Zealand. The "Dominion Monarch." Electrical Contracting at Dudley. Durban Trolley-bus Order

F.B.I. and the Ministry of Supply

IN view of the decision of the Government to create a Ministry of Supply the Federation of British Industries has decided to set up a special committee for the following purposes: To consider the terms of the Ministry of Supply Bill and the effect which the proposals contained in it may have upon the industry; to place its services at the disposal of the Minister of Supply in the event of his desiring to obtain the views or assistance of organised industry on the problems facing him; to act as a channel by which the views of the F.B.I. can be made known to the Minister on matters falling under his jurisdiction. The F.B.I. committee consists of Lieut.-Col. Lord Dudley Gordon, chairman (J. & E. Hall, Ltd.); Sir Clive Baillieu (Imperial Smelting Corporation and the British Metal Corporation); Mr. A. C. Macdiarmid (Stewarts & Lloyds, Ltd.); Mr. J. G. Nicholson (Imperial Chemical Industries, Ltd.); Mr. F. R. M. de Paula (Dunlop Rubber Co., Ltd.); Mr. J. C. Hanbury Williams (Courtaulds, Ltd.); Sir William Larke (British Iron & Steel Federation); Mr. G. H. Locock (F.B.I.) and Dr. E. C. Snow (United Tanners' Federation).

Vitreous Enamellers' Conference

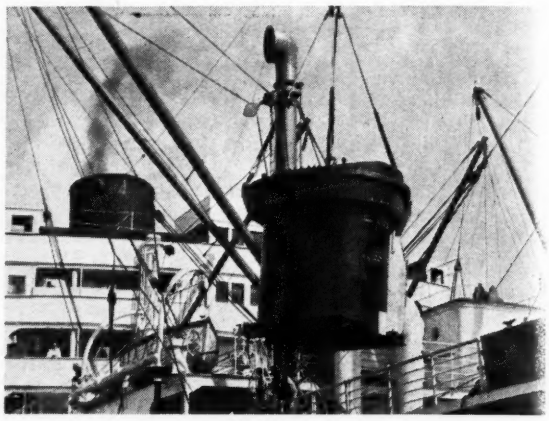
The arrangements for the sixth annual conference of the Institute of Vitreous Enamellers, to be held at the Grand Hotel, Birmingham, on September 22nd, 23rd and 24th, are now being made by the Conference Committee. The following provisional programme is tentatively arranged:—September 22nd: Works visit to various enamelling plants; annual general meeting; and annual banquet. September 23rd: Technical papers; theatre party; and supper. September 24th: Works visit. Full details will be available in due course.

"Clesco" Employees and National Defence

The County of London Electric Supply Co., Ltd., and its associated companies have until recently granted ten days' leave with full pay to all employees in the Territorial Forces who attend camp and the companies have now extended this period to a fortnight's leave with full pay. In addition, for employees who are members of units called upon to undertake a full month's training this year, pay in full will be given for the first fortnight and for the further fortnight employees will receive their normal pay less their army pay and allowances. These grants of leave are additional to the normal holiday period due to each employee.

Transformers for New Zealand

The Public Works Department of the Government of New Zealand is responsible for the generation and primary distribution of electricity in that country. Electricity is distributed at 110 kV to the various electric power boards which control the secondary distribution at 11 kV or 6.6 kV. The P.W.D. supplies the transformers for stepping down the voltage to the secondary distribution level. In recent years the British Electric Transformer Co., an associate of Crompton Parkinson, Ltd., has constructed many transformers for New Zealand. Of seven supplied to Mangahao in 1925, four were overturned in the disastrous earthquake of 1931. They were, however, soon re-working after being dried out and re-tested. The latest order placed through A. & T. Burt, Ltd., was for six 5,500-kVA, single-phase, 50-cycle, oil-immersed, water-cooled



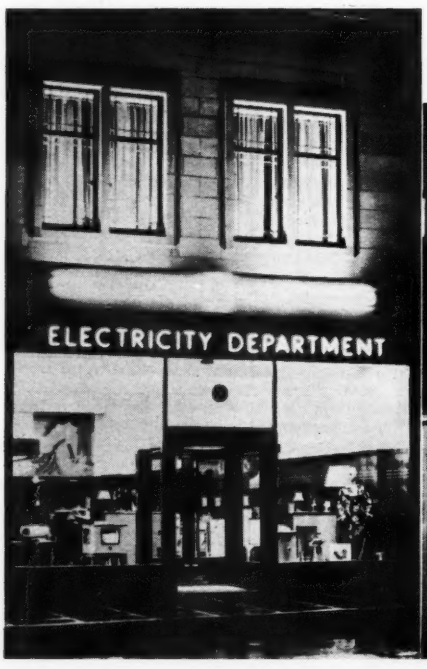
B.E.T. transformers being shipped to New Zealand

double-wound, semi-core type transformers for outdoor service. These were recently shipped to New Zealand for use at Waitaki. Forming two banks of 11/110 kV, 16,500 kVA, they will be directly connected to generators.

The transformers are each capable of giving their full output continuously with a temperature rise not exceeding 50 deg. C. as measured in the hottest part of the oil or 60 deg. C. as measured by the increase in resistance of the windings. They have a no-load ratio of 63.5/11 kV, no tappings being provided. The company has a further order in hand for New Zealand to supply seven 7,400-kVA, single-phase transformers to form two 22,200-kVA, 11/110-kV delta/star banks with one spare unit. They will be used at Waikaremoana.

Argentine Electricity Supply Industry

The Argentine Government Statistical Department recently issued its report on a census of the electricity production from which it is observed that in 1937, the year to which the information applies, there were 934 generating plants, of which 915 were in operation on December 31st, 1937, learn's *Reuters Trade Service* from Buenos Aires. Ten had been in operation part of the year but had closed down by the date mentioned. The industry had 7,304 employees, 11,571 labourers, and 575 proprietors or directors. Salaries paid from January 1st to December 31st, 1937, totalled 43,418,000 pesos; the fuel

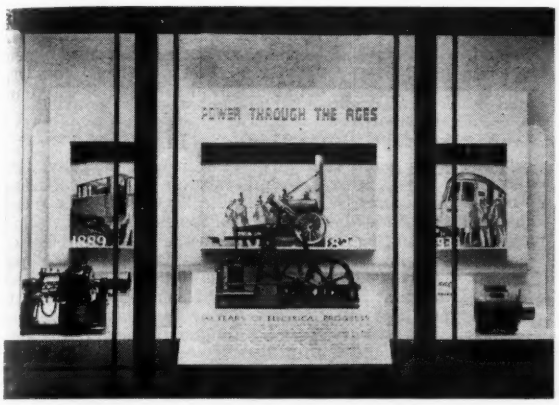


The exterior and the general showroom of the new premises of Hamilton Electricity Department, the opening of which was reported in our last issue

and lubricants consumed amounted to 29,201,000 pesos; and the total invoiced by the companies was 219,931,000 pesos. The output was 2,302,150,000 kWh and consumption amounted to 1,799,816,000 kWh.

Progress in Mechanical Power

An interesting window display was recently presented at the Middleton Corporation showrooms. Subsequently, by the courtesy of Mr. A. M. Mulliner, chief electrical engineer to Middleton Corporation, the display was shown in one of the windows of the General Electric Co., Ltd., at Magnet House, Kingsway, London, W.C.2. As will be seen in the accompanying illustration the plant exhibited largely tells its own story, but the history of the 50-year old G.E.C. motor (seen on the left) as established by Mr. Mulliner, is worth recording. The manufacturers' nameplate and number show that the motor was one of the earliest built by the G.E.C. in its Manchester works, just over 50 years ago. It was purchased second-hand about 30 years ago by a hay and corn dealer in Middleton, since when it has been working in a loft with a box over it, which sometimes was covered with chaff and dust. There has been little wear on the bearings, and not one penny has been spent on these during the 30 years' service. The commutator is in excellent condition. Although now replaced by a modern machine, this veteran motor could still be relied upon for service in emergency.



Window display showing mechanical power progress

M.V. "Dominion Monarch"

Having a gross tonnage of 27,155, the *Dominion Monarch* (now on her maiden voyage to New Zealand and back) is the most powerful British motor ship. Constructed by Swan, Hunter & Whigham Richardson, Ltd., for the Shaw, Savill and Albion Co., Ltd., the vessel provides accommodation for 517 first-class passengers. An electric hotel and auxiliary service is provided by five 600-kW, 220-V, DC generators driven by 900-BHP six-cylinder oil engines. The sets are mounted on fabricated steel baseplates supported on "Coresil" pads. Flexible sections are inserted in all pipe lines, and where these are attached to the bulkheads a special suspension prevents transmission of noise and vibration to the ship's structure.

This plant was constructed by W. H. Allen, Sons & Co., Ltd., who also supplied more than fifty motors and controllers for the auxiliary drives. These include two 90-HP motors for the steering gear (Brown Bros.), four 160-HP motors for the main refrigerating compressors (J. & E. Hall, Ltd.) and smaller motors for driving brine and water pumps and fans and also for the air conditioning plant (Carrier Engineering Co.).

Garden Planning

We have received from Graham Farish, Ltd., Bromley, Kent, a handsome publication bearing the above title (price 1s.). The company makes fountains, floodlights and other equipments for the garden, but although these are mentioned the book has a much wider scope. For instance, it contains practical articles on the design of gardens and "landscape" work; the use of cement; rock plants; greenhouse heating; under-water lighting; and portable bathing pools. The illustrations are reproductions of pencil drawings and are particularly good.

Irish Electrical News

A resolution that the Executive Council was of opinion that private enterprise in the electrical trade was hampered by state trading as carried out by the Electricity Supply Board was adopted at a meeting of the Society of Irish Electrical Traders, which was held in Findlater Chambers, 28, Upper O'Connell Street, Dublin, recently. Mr. C. W. Symmonds (Falk, Stadelmann & Co.) presided.

Workers on the annual overhaul of the Electricity Supply Board transmission towers will receive retrospective increases in wages from May 8th as a result of negotiations between the Board and the No. 3 Branch of the Irish Transport and General Workers' Union.

The suggestion that a tender by the Electricity Supply Board should be sent to the Prices Commission was made at the Dublin Board of Health, when a meeting of that body was informed that the cost of an electrical installation for pumping water to Finglas in connection with the new water supply there would be £395. It was stated that the service would require a new high-voltage line to the area. Mr. W. Rollins, a member, recommended that the Board of Health should apply to the Electricity Supply Board for a scaling down of the tender. The population of Finglas was 1,100, and they were being charged £400 for pumping the water. The tender was sent back to the Board for reconsideration.

Tables of Electricity Undertakings

The 1939-40 edition of the "Electrician" Annual Tables of Electricity Undertakings (Benn Bros., Ltd., 10s. net), is compiled from data supplied by electricity authorities and companies all over the world. There are four tables grouping such information as systems of supply, consumers' voltages, electricity tariffs, owners of the undertakings and the names of the engineers under the headings of United Kingdom, the British Empire and foreign countries. There is also a section with maps, describing the current development, equipment and tariffs of the grid system.

Electrical Contracting at Dudley

At a recent meeting of the Dudley Corporation Housing Committee it was reported that the Electrical Contractors' Association had requested that the Corporation should restrict the placing of electrical installation contracts to members of the Association. The Association has been informed that the Committee could not agree to this, but was prepared to stipulate that firms tendering should be members of either the National Register of Electrical Installation Contractors, the Institution of Electrical Engineers or the Electrical Contractors' Association.

Trolley-Bus Equipment for Durban

The Durban Corporation Passenger Transport Department has recently ordered sixteen six-wheeled double-deck trolley-buses, of which the chassis and mechanical parts will be manufactured by Leyland Motors, Ltd., and the electrical equipment by the General Electric Co., Ltd., at its Witton Engineering Works, Birmingham. Each bus, which will seat 70-72 passengers, will be equipped with one 100-HP compound-wound traction motor, type WT26, together with control gear suitable for limited regeneration and both run-back and coasting brakes, the latter having to negotiate gradients reaching a maximum of 1 in 6.

A Cooker Display Cut-out

English Electric cookers fitted with "Ritemp" automatic oven control have been adopted by many supply authorities in all parts of the country for hire and hire-purchase schemes, and the cut-out display illustrated in the accompanying picture has been specially designed to emphasise the idea of freedom from the kitchen, which is crystallised in the phrase "Leave it to Ritemp." This links up with the company's slogan "Set it, forget it" which has been associated with propaganda for "Ritemp" cookers since their inception. The display is attractively produced in full colours and its construction is such that it can be used in both large and small showroom windows, showroom interiors, &c. Another feature is the ease with which the display can be folded for storing.

A "Ritemp" cooker display cut-out

French Electrical Industry Conference

Under the auspices of the Chambre Syndicale des Industries Electriques et Radio-Electriques de l'Ouest, a national electrical engineering conference is to be held at Rennes on June 23rd, 24th, and 25th

Price Reduction

Smith's English Clocks, Ltd., have announced after studying the discounts agreed by the Fair Trading Council, that they

have come to the conclusion that it would be more satisfactory to fall into line with the recommendations of the Council. This has enabled them to reduce the list price of the electric clock timer. They are also offering a combined bracket and terminal block. Owing to work of national importance, delivery of tools and component parts will be delayed until the early autumn.

The Industrial Branch of Smith's English Clocks, Ltd., was formerly known as Synchro Time Systems, Ltd., but will in future operate as English Clock Systems, Ltd. The change of name has been made because it is felt that closer connection to the parent company should be evident in the name. The address of the company will remain at Relyon House, 57-63, Wharfdale Road, King's Cross, London, N.1.

New Municipal Showrooms

The Mansfield Corporation Electricity Department's new showroom in Regent Street will be officially opened by Sir Cyril Hurcomb, chairman of the Electricity Commission, on June 20th.

A new electricity showroom in Wood Street, S. Annes, provided by the Lytham St. Annes Corporation, was opened on June 1st by the Mayor (Councillor W. Jowett), who said it would benefit not only the undertaking and the staff, who would work under better conditions, but also the ratepayers. He paid a tribute to Mr. J. C. Fairchild, the electrical engineer. Councillor J. W. Horsfall, chairman of the Electricity Committee, outlined the progress made by the undertaking since 1935.

Changes of Name

The Municipal Tramways and Transport Association (Inc.), has changed its name to the Municipal Passenger Transport Association, Inc.

The name of Clifford & Snell (Eng.), Ltd., has been changed to Clifford & Snell, Ltd.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, ETC.	Price June 7th	Fortnight's inc. or dec.
a	Acid Oxalic ... ... per cwt.	50s.	—
a	Ammoniac, Sal ... ... per ton	£37	—
a	Ammonia, Muriate (large crystal)... ,,	£18 10s.	—
a	Borax... ... ... ,,	£17	—
a	Copper, Sulphate ... ... ,,	£19	—
a	Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a	,, Perchlorate ... ... ,,	6d.	—
a	Shellac ... ... per cwt.	£4 8s.	—
a	Sulphur, Commercial ... ... per ton	£11	—
a	,, Roll ... ... ,,	£11	—
a	Soda, Chlorate ... ... per lb.	3½d. to 3¾d.	—
a	,, Crystals ... ... per ton	£5 to £5 5s.	—
a	Sodium, Bichromate, casks ... per lb.	4½d. net.	—
	METALS, ETC.		
b	Aluminium, Ingots ... ... per ton	£94	—
b	,, Wire ... ... per lb.	1/1 to 1/9	—
b	,, Sheet and Foil ... ,,	1/2½ to 2/9	—
p	Babbits Metal and Anti-friction Metals—		
	Grade I ... ... per ton net	£197	—
	Grade II ... ... ,,	£137	—
	Grade III ... ... ,,	£73	—
c	Brass (rolled metal 2" to 12" basis)... per lb.	8½d.	—
c	,, Tubes (solid drawn) ... ... ,,	11½d. to 11¾d.	—
c	,, Wire, basis ... ... ,,	8½d.	—
c	Copper Tubes (solid drawn) ... ,,	1/0½d.	—
g	,, Bars (best selected) ... per ton	£78	—
g	,, Sheet... ... ... ,,		
g	,, Rod ... ... ,,		
d	,, (Electrolytic) Bars ... ... ,,	£48 15s.	£1 inc.
d	,, ,, Wire Rods ... ,,	£53 10s.	£1 inc.
d	,, ,, H.C. Wire ... per lb.	7¼d.	¼d. inc.
f	Ebonite Rod ½" dia. & up. ... ,,	1/10 to 2/5	—
f	,, Sheet ⅛" thick & up. ... ,,	1/5 to 1/10	—
n	German Silver Wire, Nos. 1 to 12... ,,	2/4	—
h	Gutta-percha, fine ... ... ,,	Nom.	—
h	India-rubber, Para-fine ... ... ,,	7¼d.	—
i	Iron, Pig (Cleveland, No. 3) ... per ton	£4 15s.	—
i	,, Wire galv. No. 1 P.O. Qual.... ,,	£23	—
g	Lead, English Pig ... ... ,,	£16 10s.	—
g	Mercury ... ... per bot.	£16	—
e	Mica (in original cases) small ... per lb.	1/– to 2/6	—
e	,, ,, ,, medium ... ,,	7/6 to 15/–	—
e	,, ,, ,, large ... ,,	17/6 to 22/6 up	—
p	Phosphor Bronze, plain castings ... ,,	1/2½	—
p	,, ,, drawn bars & rods ,,	1/1d.	—
p	,, ,, rolled strip & sheet ,,	11½d.	—
p	,, ,, wire ... ... ,,	1/1½d.	—
o	Platinum ... ... per oz.	£7 10s.	—
d	Silicium Bronze Wire ... ... per lb.	8½d.	—
g	Spelter ... ... per ton	£14	6s. 3d. inc.
g	Tin, Block (English) ... ... ,,	£225 10s.	5s. inc.
m	,, Wire, Nos. 1 to 16 ... ... per lb.	3/6	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe
m P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in this section under the same heading.

It should be noted that prices quoted for copper do not include any allowance for insurance against war risks.

Brush Company's New Extensions

A further large extension in the form of a completely new machine shop, laid out and equipped on the most modern lines, has now been almost completed by the Brush Electrical Engineering Co. This addition has become necessary to deal with the large number of orders on hand, and to facilitate the manufacture of other products which the company may contemplate. The new shop will provide work for well over a hundred skilled men, trained to operate all types of modern machine tools. Within easy reach of the works new housing estates comprising modern homes in delightful surroundings are ready for occupation at very reasonable rentals.

Mallory Metallurgical Products

An arrangement has been concluded whereby Johnson, Matthey & Co., Ltd., have acquired a controlling interest in Mallory Metallurgical Products, Ltd., and the offices of this company have been removed to those of Johnson, Matthey & Co., Ltd., 78, Hatton Garden, E.C.1. A new factory is being erected at Wembley for the production of the Mallory range of "Elkonites" and copper alloys for use as electrical contacts, switchgear components and resistance welding electrodes, and it is intended to develop the sales and service organisation along more effective lines in conjunction with Johnson, Matthey & Co. Mr. S. S. Moore Ede and Mr. A. E. Coussmaker, directors of Johnson, Matthey & Co., have joined the board of Mallory Metallurgical Products, Ltd., and Dr. L. B. Hunt continues to act as technical manager of the company.

Modern Shop Window Lighting

For the show windows of their newest West End premises at Hereford House, Marble Arch, London, W.1, C. & A. Modes, Ltd., have again chosen the "Realite Super-Mix" balanced light principle of Rowlands Electrical Accessories, Ltd., using mercury and tungsten lamps in conjunction with a system of special filters. For this installation the system uses Philips' "Philora" mercury lamps and Philips' tungsten lamps. The quality of the light is a very close approximation to daylight, giving a very high degree of accuracy in colour rendering. The lighting fittings are specially designed to give a wide distribution of light, and are recessed in a sloping soffit, which is provided round the entire window construction. This method of mounting the units provides the best lighting effect on the materials displayed, and also provides a high light cut-off on the back panels. The lighting units are of square construction and are fitted flush with the sloping soffit, the interior shape being of cut-off pyramid form. Each fitting houses one "Philora" mercury lamp and four Philips' tungsten lamps, and the fronts of the units are provided with a special diffusing glass. The installation comprises ninety-two principal units of 837-W each. These are made up of one "Philora" 125-W mercury lamp with two 200-W and two 150-W standard Philips' tungsten lamps. Twenty-five smaller units each contain one 80-W mercury lamp and four 100-W tungsten lamps. The window lighting equipment was supplied by Rowlands Electrical Accessories, Ltd., and all the lamps, both mercury and tungsten, and the discharge lamp control gear by Philips Lamps, Ltd.

An Electric Service Van

On June 1st one of the new aluminium alloy electric vehicles, which are now being made by Cleco Electrical Industries, Ltd., was formally handed over by the company to the Leicester Corporation Electricity Department. This new type of vehicle, which we illustrated and described in our issue of May 12th (page 695), makes possible not only a reduced chassis and body weight, but also the incorporation of a more powerful motor. Mr. D. H. Parry, who accepted the vehicle on behalf of the Electricity Department, stated that he had every hope that the vehicle would do everything claimed for it.

Trade Announcement

The Sturdy Electric Co., Ltd., the registration of which is recorded on page 856, has been formed to take over and carry on the business of the Sturdy Electric Co. The present activities include the production of transformers and chokes for the radio and allied trades, public lighting, neon signs, &c., and a department is equipped to supply special transformers at short notice and to carry out rewinds of all descriptions. A new "Sturdy" arc-welding transformer has been developed and arrangements are being made to place this on the market at an early date. The business of the company has been transferred to larger premises at Pontop View, Dipton, Newcastle-on-Tyne.

New Catalogues and Lists

M.K. Electric, Ltd., Wakefield Street, Edmonton, London, N.18.—A leaflet relating to "Slot" switch sunk units fitted on a new pressed-steel box.

Allen West & Co., Ltd., Brighton.—A 20-page illustrated catalogue of high-voltage metal-clad switchgear.

Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, London, E.C.1.—Catalogue No. 762, dealing with "Antarctic" electric fans.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—A leaflet relating to new flexible couplings.

Electrocult, Ltd., Harpenden.—A catalogue of electro-horticultural equipment.

John Harper & Co., Ltd., Albion Works, Willenhall, Staffs. —"The Art of Make-up"—an interesting and unusual booklet dealing with Harper castings and pressings.

Walker's Electrical Engineering Works, Annandale St. Lane, Edinburgh.—A stock list of reconditioned and second-hand equipment.

Sloan Electrical Co., Ltd., 54-55, Fetter Lane, London, E.C.4. —Catalogues of fans, vacuum cleaners, refrigerators, and dry shavers.

Rotherham & Sons, Ltd., Coventry.—A folder on clocks for all types of scientific and industrial recording instruments. Catalogues of mechanical time lags, pumps for oil or suds, and small parts.

Pickerings, Ltd., Globe Elevator Works, Stockton-on-Tees.— Details of a new type of service lift.

Silentbloc, Ltd., Victoria Gardens, London, W.11.—A folder illustrating the action of "Silentbloc" bearings.

J. J. Eastick & Sons, 118, Bunhill Row, London, E.C.1—An electrical and radio catalogue for the trade.

W. Edwards & Co., Allendale Works, Southwell Road, Loughborough Junction, London, S.E.5.—A leaflet describing mobile vacuum or pressure pumping units.

National Gas and Oil Engine Co., Ltd., Ashton-under-Lyne.— A catalogue of series "B" Diesel engines.

Bankruptcy Proceedings

A. W. Schofield, 24, Balmoral Drive, Denton, Lancs, and **D. Tanner,** 118, Hyde Road, Denton, both formerly trading together in co-partnership at 673, Manchester Road, Denton, under the style of Schofield and Tanner as registered electrical and radio engineers.—The public examination took place at the Town Hall, Ashton-under-Lyne recently. The joint statement of affairs filed showed gross liabilities of £3,978, of which £2,029 was expected to rank for dividend, with assets of £943, leaving a deficiency of £1,086. The debtors attributed their failure to overtrading on the hire-purchase system. The examination was closed.

C. W. Simmons, 34, Brougham Hayes, Bath, radio engineer. —This debtor's public examination was held at the County Court Offices, Abbey Street, Bath, recently. It was reported that there were gross liabilities of £748, of which £649 was expected to rank for dividend, with estimated assets of £25, leaving a deficiency of £624. Debtor attributed his failure to lack of capital, heavy overhead expenses, and failure to meet the claim of a finance company. The examination was adjourned.

W. G. Baker, carrying on business under the style or firm of Baker and Co., 19a, Angel Hill, Bury St. Edmunds, radio dealer.—This debtor's public examination took place at the Guildhall, Bury St. Edmunds, recently. According to the statement of affairs filed there were gross liabilities of £332, of which £329 was expected to rank for dividend, with a deficiency estimated at £219. The examination was formally adjourned.

J. Bott, 276A, Alfred Street Central, Nottingham, and lately carrying on business at 41, Wilford Road, Nottingham, wireless dealer.—This debtor's public examination took place at the County Court House, St. Peter's Gate, Nottingham, on June 1st. He stated that he commenced trading as a radio dealer in August, 1938. He attributed his failure to inexperience, bad trade and competition. The deficiency was stated to be £67. The examination was closed.

H. A. Langlois, trading as Electrical Installation Co. and/or Electrical Contracting Co., 2, Atlas Place, Cardiff, and 22, Pocklingtons Walk, 94, Rutland Street, and Gartree Street, Leicester. —Discharge suspended for twelve months until May 1st, 1940.

C. E. Ross and **T. E. Perks** (Ross & Perks), electrical engineers, 166, Piccadilly, London.—Trustee, Mr. R. Mountstephen, 15, Eastcheap, London, E.C.4, appointed May 25th.

F. G. T. Lane, wireless dealer, 101, Crouch Street, Colchester. —Trustee, Mr. K. E. Fisk, 13A, Great Colman Street, Ipswich, Official Receiver, released May 30th.

S. R. Phipps, electrical engineer, Alcester Road, Studley.— Last day for receiving proofs for dividend, June 17th. Trustee, Mr. C. J. Band, 9-11, High Street, Coventry, Official Receiver.

Company Liquidation

The Western Radio & Supplies, Ltd., Cardiff.—The first meetings of creditors and shareholders under the compulsory liquidation of this company were held on May 31st at the Board of Trade offices, Carey Street, W.C., before Mr. Joseph Cowen, Assistant Official Receiver. The statement of affairs showed unsecured debts of £1,604; debenture claims of £1,129; preferential claims of £28; and a fully secured creditor for £36. The assets were valued at £1,041 and were entirely absorbed by the preferential and debenture claims. The liquidation was left in the hands of the Official Receiver.

Thorne & Parry (1937), Ltd., radio dealers, &c., Llangelefach Road, Brynhyfryd, Swansea.—The statutory meeting of creditors was held recently at Swansea, when Mr. Thorne, a director, occupied the chair, and reported that the shareholders had previously met and passed the usual resolution for the voluntary liquidation of the company with Mr. L. S. Findlay, of Poppleton & Appleby, 35, Windsor Place, Cardiff, as liquidator. It was stated that the liabilities totalled £320. The total assets were £89, leaving a deficiency, so far as the creditors were concerned, of £231. The creditors confirmed the voluntary liquidation and a committee was also appointed.

Harwol Specialities Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. A. Ross, 51, North John Street, Liverpool.

Information Department

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

SIMPSON fire.

HOUSER or HAUSER juice extractor.

CORRESPONDENCE

Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication. The Editors cannot accept responsibility for correspondents' opinions

Blended Light

The article contained in your issue of May 26th on blended light is of great interest, but we are not in agreement with one or two points put forward by Mr. Olsen and think that our observations may be of interest to those who have read the article.

In the first place, we are sure that Mr. Olsen will not mind our mentioning that in the main his article appears to be based on the data contained in the handbook which we published some twelve months ago on colour corrected mercury lighting, and naturally we are in agreement with most of his observations, but we do not agree with the statement that one 80-W mercury lamp arranged in conjunction with 400-W of tungsten light gives really accurate colour appreciation. It is true that this proportion of mercury and tungsten wattage is the proportion which we provide in our "Super-Mix" arrangement, but really accurate colour appreciation can only be obtained by the use of a filter system in conjunction with the mercury discharge lamp.

In dealing with the question of power-factor correction Mr. Olsen misses one most important point, that is, that a B.L.P. lighting fitting embodying a normal proportion of mercury and tungsten has so high a power factor that additional correction is usually superfluous. The power factor of a group of lamps comprising one 80-W mercury and four 100-W tungsten lamps is approximately 0.84.

One further point: Mr. Olsen states that the new small-size fluorescent discharge lamp will prove a great boon, as the correction required is far less than the correction required for an ordinary mercury discharge lamp. It is true that the proportion of red rays in the fluorescent lamp is increased by approximately 4 to 5 per cent., but the experience of our research department is that the colour of light emitted from a fluorescent discharge lamp is far more difficult to correct adequately than the colour of light emitted from the ordinary mercury discharge lamp.

R. W. SAYERS,
Manager,
Illuminated Engineering Section,
Rowlands Electrical Accessories, Ltd.

Birmingham, *June 3rd.*

Explanation Wanted

I would be pleased if readers could kindly give an explanation or opinion why a fire should have occurred in premises which had been most carefully wired.

The DC installation in this house was carried out completely in screwed conduit with a steel box fitted behind each point and switch and an ironclad fuseboard, the whole being efficiently bonded to an approved earth. A continuity test made after the fire gave satisfactory results.

At the time of the occurrence a conductor was being disconnected from a switchplug without withdrawing the circuit fuse (5 A); the screwdriver or wires accidentally touched the steel box and blew the circuit fuse and at the same time a fire broke out in the floor space above. On examination it was seen that a compo gas pipe was lying alongside the conduit; this gas pipe had been damaged by arcing and the gas ignited. All fuse wires were examined and found to be correct (tin and copper).

Why should a "short" such as that described cause an arc to damage a gas pipe and not be conducted by the bonding, which was proved to be good and intact? What precautions can one employ to guard against a recurrence?

In this particular instance it would be very costly to strip the premises to make sure that the existing gas pipes are not in contact with the electric conduits. I would appreciate any opinion that might explain the cause of the fire and a practical solution to prevent any further accidents. PUZZLED.

ELECTRICITY SUPPLY

Barnoldswick's Bulk Supply Change. New Power Station for Birkenhead Corporation. Swansea Appointment Recommendation. Extensive Remote Control Scheme at Sunderland. Newcastle-upon-Tyne Council's Purchase Option

Aberdeen.—ELECTRICAL PLANT FOR GASWORKS.—Most of the coal and coke handling machinery at the gasworks is electrically operated, and as a safety measure the Gas Committee recently decided to install standby electricity generating plant at an estimated cost of £600.

Barking.—NEW SUB-STATION.—The Town Council proposes to erect a sub-station in Thames Road.

Barnoldswick.—BULK SUPPLY DECISION.—At a meeting on May 30th the Urban District Council decided to obtain the town's bulk supply of electricity from the Yorkshire Electric Power Co. subject to the consent of the Electricity Commissioners. The resolution means that the agreement with Nelson Corporation, which has supplied electricity in bulk to Barnoldswick for ten years, will not be renewed.

Benwick (Cambs).—SUPPLY INAUGURATED.—A supply of electricity has now been made available in the village by the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co.

Birkenhead.—NEW GENERATING STATION.—Approval was given by the Town Council on June 2nd to a scheme for a new power station at Bromborough, designed for an ultimate capacity of 120,000 kW and costing £1,250,000.

Bootle.—NEW LIGHTING IN SOUTHPORT ROAD.—The section of new street lighting recently switched on at Bootle is an interesting example of cut-off lighting correctly laid out and

New lighting installation in Bootle comprising "Osira" sodium lamps housed in G.E.C. cut-off reflectors

spaced. In this instance the spacing is arranged at 110 ft., whereas in most installations the average spacing is 115 ft. Where cut-off lanterns are employed it is undesirable to exceed 120 ft. spacing, as when this is done a patchy road appearance is produced. The Southport Road at Bootle is part of a new double-carriageway thoroughfare which, when completed, will link Liverpool with Southport. The carriageways are separated by a broad central reservation and on this are mounted the columns. These are of steel and quite plain, having been supplied without any ornamental castings, as it was felt that the absence of these would reduce the likelihood of corrosion. The lanterns are carried on long brackets and are suspended over the middle of each road at a mounting height of 25 ft. Overhead wiring, which is fairly common practice in Lancashire, is employed, this being carried on the street lighting columns. Overhead wiring imposes considerable stresses on the columns, and these had all to be calculated and allowed for before manufacture commenced. The terminal columns, which have to withstand greater strains, are made of rather heavier gauge metal. The auxiliaries, transformer, condenser and fuses, are mounted in a sheet steel box near the top of each column. The G.E.C. lanterns are of the open cut-off type and house "Osira" sodium lamps, the cut-off occurring between 75 and 80 deg. An interesting feature of the lanterns is the adoption of a small built-in condenser at the lampholder end of the lantern. Its purpose is to suppress any radio interference produced by the discharge or the transformer. The lamps are controlled by time switches, except on the roundabout where a photo-electric cell performs the switching. The installation was carried out under the supervision of Mr. W. A. Harrison, borough engineer and surveyor.

Bournemouth.—PROPOSED NEW POWER STATION.—It is proposed that the Bournemouth & Poole Electricity Supply Co. should build a 120,000-kW power station on the mud flats above Hamworthy Bridge, Poole Harbour. Plans for the building have not yet been prepared but it is estimated that it will be necessary to reclaim at least 12 acres.

Burnley.—STREET LIGHTING.—A meeting of the Town Council on June 1st approved a scheme for lighting part of Todmorden Road by sodium electric-discharge lamps. It also approved proposals for improving the lighting of bus routes other than main roads. The electrical engineer was authorised to prepare a scheme for improved lighting on the Stoops estate.

Cheltenham.—HIGH-VOLTAGE CABLE.—The Electricity Committee is to lay an 11,000-V cable from Westal Green along Hatherley Road to Hatherley Brake and thence to Coney Green and Arle Court at an estimated cost of £3,418.

BULK SUPPLY AGREEMENT.—The borough electrical engineer has reported to the Electricity Committee that after negotiations with the S.W. & S. Power Co. extending over more than twelve months and consultation with the Electricity Commissioners he has now obtained a revised offer for the continuance of the bulk supply for a further period of six years from January 1st, 1939, on rather better terms than the Corporation had obtained hitherto.

Coventry.—PROTECTION AGAINST FIRE.—The Electricity Committee is to provide fire protection apparatus at the Longford power station at a cost of £2,280.

Dalwhinnie.—WATER-POWER SCHEME.—To utilise the waters of Loch Quoich and Loch Seilich, near Dalwhinnie, a five-mile tunnel is being driven through the intervening mountainside and a three-mile aqueduct is being built in order to convey the water to Loch Ericht. The scheme, estimated to cost more than £300,000, will augment the water supply already tapped from other lochs for the Grampian Electricity Company's power-houses at Bridge of Ericht and Tummelbridge.

Douglas (I.o.M.).—STREET LIGHTING IMPROVEMENTS DEFERRED.—The Finance Committee has deferred the comprehensive plan of street lighting improvements recently submitted by the Electricity Committee.

Dover.—HIGH-VOLTAGE CABLES.—The Town Council has decided to place the high-voltage line between Folkestone Road and Buckland underground. Application is being made for a loan of £1,725 for a 6,600-V main from the Maison Dieu Road sub-station to the new dockyard.

Hazel Grove.—REMOTE CONTROL OF LIGHTING.—A scheme for the installation of centralised remote control of street lighting has been approved by the Urban District Council, which is also to provide 125 additional street lamps in the Woodford area at a cost of £1,500.

Kinghorn (Fife).—STREET LIGHTING.—The Town Council has agreed to adopt a new agreement with Fife Electric Power Co. for street lighting in the burgh. The agreement makes the town responsible for maintenance of equipment, including the nine additional street lamps which are to be erected.

London.—HAMPSTEAD.—The cold weather last Christmas is reflected in the electricity undertaking's results for the past year by a deterioration of the load factor to 24.45 per cent., the lowest for ten years. The net income was £228,047, an increase of £8,844, but working expenses rose by £26,154 to £218,223, and there was a net profit of £9,066 against £27,237 in the previous year. As £25,932 has been allowed for capital expenditure out of revenue the aggregate credit balance in hand has been reduced. For several years the undertaking has had no debt on capital account, but a loan of £26,000 has now been raised for mains and transformers. During the year the number of consumers rose by 1,472 to 27,400 and energy sales improved by 5 per cent. to 47 million kWh. Mr. H. Brierley is borough electrical engineer.

SOUTHWARK.—The Electricity Committee is to install assisted wiring in various premises at a cost of £684.

POPLAR.—At a recent Council meeting Alderman C. W. Key reported that 72 million kWh was sold during 1938-9, as compared with 67 million kWh during the previous year. He was particularly pleased at the phenomenal increase in the use of electricity for domestic purposes. The amount used for cooking had now reached a total of practically 9,000,000 kWh a year, or 0.70 kWh per head. There were 10,500 cookers connected to the mains.

Morley.—LARGE INCREASE IN SALES.—An improvement of 33 per cent. in sales of energy is revealed in the 1938-39 report of Mr. N. Hunter, borough electrical engineer and manager. This was largely due to power supplies, which rose from 1,345,000 to 2,303,000 kWh. This satisfactory situation industrially should be further improved as the result of the proposal of one consumer to electrify two mills completely. During the year the number of consumers rose from 6,215 to 6,485, and the total connected load increased by 25 per cent. The engineer observes that the accommodation for the weekly demonstrations at the showrooms has proved inadequate, and that it has been necessary for them to turn a number of consumers away.

Newcastle-on-Tyne.—PURCHASE OPTION POSTPONED.—The City Transport and Electricity Committee has decided to postpone until July next year its option to purchase the undertakings of the North-Eastern Electric Supply Co., Ltd., and the Newcastle & District Electric Lighting Co., Ltd., in the city area.

North-West Midlands.—INQUIRY.—The inquiry into the J.E.A.'s scheme to build a power station costing £1,300,000 at Barlaston was opened this week at Stoke-on-Trent. A number of local authorities were represented as objectors to the scheme on the ground that it would affect the amenities of the district. Mr. W. Craig Henderson, K.C., for the Authority, said that the proposed site was the only suitable one. The general objection against the power station was that an industrial building was being taken into a rural community. Josiah Wedgwood and Sons, pottery manufacturers, however, proposed to build a factory and 1,600 houses.

Nottingham.—LOAN.—Application is being made for permission to borrow £250,000 for general expenditure on the undertaking.

Plymouth.—ILLUMINATIONS.—Switching on the illuminations recently the chairman of the Parks and Recreation Committee, Mr. E. S. Leatherby, said he regretted that financial restrictions, owing to A.R.P. expenses, had prevented much alteration from previous years. However, it was expected that something like 30,000 kWh would be used during the season.

Sunderland.—PROPOSED NEW CENTRAL CONTROL SYSTEM.—The remote control system manufactured by Standard Telephones and Cables, Ltd., has been adopted by Sunderland Corporation. This system will ultimately control 5,510 street lamps and will be used for all the air raid syrens in Sunderland, the calling out of air raid wardens, firemen and all national emergency services. In addition, the system will be used for the control of off-peak loads. The central control will be installed at the electricity works in Dunning Street and an additional press-button control will be extended to the office of the chief constable. This is said to be the largest scheme of its kind in the country.

Swansea.—TRANSMISSION SCHEME.—Last week the Electricity Committee adopted a number of recommendations made by the new electrical engineer and manager, Mr. H. E. Blackiston. It was agreed to recommend the Council to extend the electricity transmission system in the town so that supplies can be given other than through the Strand station. This will relieve the load on the mains from Tir John station to the Strand, and provide an alternative circuit in case of a breakdown. The cost for the necessary sub-station, switchgear, transformers, &c., in connection with the proposed extension was estimated at £30,000.

PROPAGANDA.—Approval was given to a scheme for propaganda expenditure under which 1 per cent. of the revenue from the sale of electricity (excluding bulk supplies) plus the gross surplus on the sale of fittings would be earmarked for the purpose. It was estimated that £4,000 would thus be available to cover the cost of the showrooms and all publicity expenditure.

APPOINTMENT RECOMMENDATION.—The Council had referred back a recommendation to appoint a deputy borough electrical engineer at a salary of £900, rising to £1,100 a year, and after further considering the matter the Committee decided to recommend the Council to appoint a chief technical assistant to the engineer at a salary of £682 7s., rising to £727 6s. a year.

COST OF CARS.—Mr. Blackiston having reported that he considered the cost of private cars used for the transport of engineers grossly high, the Committee adopted suggestions that in future engineers should drive the cars themselves; that the services of the four drivers released should be utilised elsewhere; and that a further three cars should be provided. The saving was calculated at £187 per annum.

SAVING IN PUBLIC LIGHTING MAINTENANCE.—The Committee adopted the reorganisation suggested by the engineer to economise on and improve the efficiency of the public lighting maintenance system. The scheme was estimated to lead to a net saving of £1,680 per annum, and it was stated that seven men who would be displaced would be found employment elsewhere.

SUPPLY TO ENGINEER'S HOUSE.—At Mr. Blackiston's own request, because he did not approve of electricity being supplied free to the chief's private house, the Committee agreed to the sum of £20 being charged him.

Turton.—SODIUM LIGHTING.—A scheme for the provision of sodium lamps in Longsight Road was accepted by the Town Council on June 1st.

West Hartlepool.—EMERGENCY BULK SUPPLY.—The Town Council at its recent meeting decided to submit to the Home Office a plan for providing an auxiliary bulk supply of electricity in case of war.

SUB-STATIONS.—Application is being made for permission to borrow £10,000 for the provision of sub-stations.

COMMUNICATIONS

France.—BROADCASTING DEVELOPMENTS.—A *Reuter* message from Paris states that the new television transmitter which has been operating on Eiffel Tower aerials since January is said to be the most powerful in the world. The claim was put forward by M. Jules Julien, the French Minister of Posts and Telegraphs, in the Senate last week in reply to criticisms from senators who urge improvements in the number and power of French radio stations and in the quality of their programmes. He also said that France now possessed a national radio station in Radio Paris, which was equipped with two interchangeable transmitters of 450 kW. A modern station had begun broadcasting a few weeks ago at Tunis and would have a power of 120 kW in September, while another 120 kW station would begin working next month at Essarts-le-Roi (Seine-et-Oise). Other 100-kW stations would gradually be brought into use to raise the number to nine. Modern studios were being constructed in Paris, Strasbourg and Lyons.

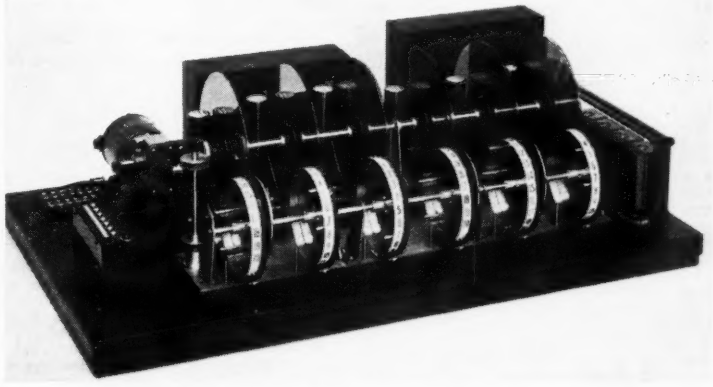
Great Britain.—INAUGURATION OF NEW TRANSMITTERS.—From June 14th next the new transmitters at Start Point and Clevedon will broadcast the B.B.C. Western programme at present provided by transmitters at Washford, Bournemouth and Plymouth, and the Duke of Somerset is to perform the opening ceremony on that date.

PROGRESS OF TELEVISION.—The achievements of the B.B.C. in the realm of television are dealt with in a readable and informative manner in an article by Edward Liveing which appears in the June issue of *The Fortnightly*. The various factors which influence the position are stated clearly and the technical and financial difficulties which hinder rapid development and programme matters all receive attention.

Madeira.—RADIO-TELEPHONE SERVICES.—Radio-telephone communication has been inaugurated between Portugal (Lisbon) and Madeira (Funchal) and also between Madeira and the Azores.

Norway.—RADIO IMPORT RESTRICTIONS.—The Norwegian Department of Commerce has issued a decree restricting the radio import trade. No complete receivers or components of foreign make may be imported without a licence issued by the Department. Single loudspeakers are exempted from the embargo.

"TALKING BAROMETER" SERVICE.—In reply to a recent question in Parliament, the British Postmaster-General (Major G. C. Tryon) stated that the possibility of introducing a "talking barometer" telephone service similar to the "Tim" time clock was under investigation. The accompanying illustration shows apparatus of this kind in use in Norway. This service, known as "Miss Weather," is exceedingly popular.



The Norwegian "Miss Weather"

Electric Vehicles in Birmingham

THE Salvage Committee of the Birmingham City Council, in its annual report on the disposal of house, trade and market refuse, states that it has a fleet of 137 electric refuse collection vehicles—the largest number operated by any municipality in the country—82.33 per cent. of the refuse being collected by electric vehicles. The net cost of collection and disposal per 1,000 population in various towns is given as follows: Birmingham, £236; Liverpool, £257; Manchester, £266; and Sheffield, £250.

Income-tax Decision

AN appeal by the South Shields Corporation against the borough's 1935-36 income-tax assessment has been upheld by the Special Commissioners for Income-tax. The Corporation was backed by 120 municipalities, and it is stated that the decision will mean a saving of between £250,000 and £500,000 a year to local authorities with profit-carrying undertakings. The Commissioners may appeal to the High Court.

FINANCIAL SECTION

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

Robertson Engineering Co., Ltd.—Private company. Registered May 31st. Nominal capital, £20,000. Objects: To adopt an agreement between Robertson Coolers, Ltd., J. H. Robertson, Philco Radio and Television Corporation of Great Britain, Ltd., and J. H. Robertson (for this company), and to carry on the business of aeronautical, mechanical, electrical, motor and general engineers, manufacturers of and dealers in aeronautical, mechanical, electrical, refrigerating, cooling, heating, ventilating and other apparatus, &c. First directors: C. C. Rattoy, J. H. Robertson, L. D. Bennett and W. A. Stone. So long as they each hold 25 per cent. of the issued shares, Philco Radio and Television Corporation of Great Britain, Ltd., and Robertson Coolers, Ltd., may each appoint half the directors. Solicitors: Lawrence Mosser & Co., 16, Coleman Street, E.C.2.

Leeds Combustion and Engineering Company, Ltd.—Private company. Registered May 26th. Capital, £300. Objects: To carry on the business of consulting, constructional, mechanical and electrical engineers, makers of all kinds of iron and steel structures or implements, &c. Subscribers: E. W. Simmonds and S. G. Brook, of 2, Bond Court, E.C.4. Solicitors: Linklaters & Paines, 2, Bond Court, E.C.4.

Sturdy Electric Co., Ltd.—Private company. Registered May 26th. Capital, £1,000. Objects: To acquire the business of manufacturers carried on by Robt. B. Davie and others at Dipton, Co. Durham, as the Sturdy Electric Co. Directors: R. B. Davie and E. Davie, both of 1, Wesley Terrace, Dipton. Registered office: Pontop View, Dipton, Co. Durham.

Jessops (Hoyland), Ltd.—Private company. Registered May 30th. Capital, £500. Objects: To carry on the business of manufacturers, repairers and hirers of and dealers in electrical and mechanical apparatus, accessories and components, and in particular wireless sets, valves, gramophones, &c. Directors: D. S. Jessop, 7, Market Street, Chapeltown, near Sheffield (permanent managing director), and C. F. Jessop and R. Warrender, both of 136, West Street, Hoyland, near Barnsley, Yorks, which is the registered office.

Belmont Radio and Television, Ltd.—Private company. Registered May 31st. Capital, £100. Objects: To carry on the business of electrical, radio and television engineers, woodworkers, cabinet makers, &c. Directors: A. A. Juviler, 56, Rodney Court, Maida Vale, W.9, and S. F. Cuffe, C.A., Audley Lodge, Somerset Road, New Barnet, Herts. Registered office: 13/15, Ridgmount Street, W.C.1.

Peterborough Extensible Electric Lamps, Ltd.—Private company. Registered May 31st. Capital, £100. Objects: To carry on the business of manufacturers of all classes of electric lamps and lampholders, electrical supplies and components, &c. Directors: H. A. Stock, 54, Parliament Street, Peterborough, A. J. Wilmot, 22, Clifton Avenue, Peterborough, and H. Pitt, Corinne Crescent, Peterborough. Registered office: 13, Queen Street, Peterborough.

Companies' Returns

Statements of Capital

Power Securities Corporation, Ltd.—Capital, £2,000,000 in 1,000,000 7 per cent. cumulative participating preference and 1,000,000 ordinary shares of £1. Return dated March 1st. 500,000 preference and 800,000 ordinary shares taken up. £1,300,000 paid. Mortgages and charges nil.

Victoria Electric Plant Co., Ltd.—Capital, £1,000 in £1 shares. Return dated Dec. 28th, 1938 (filed March 6th, 1939). 253 shares taken up. £253 paid. Mortgages and charges: £550.

Windsor Electrical Installation Co., Ltd.—Capital, £150,000 in 65,000 ordinary, 50,000 5 per cent. preference, 25,000 7 per cent. preference and 10,000 unclassified shares of £1. Return dated March 7th. 65,000 ordinary, 23,532 5 per cent. preference and 25,000 7 per cent. preference shares taken up. £88,532 paid on the ordinary and 5 per cent. preference shares. £25,000 considered as paid on the 7 per cent. preference shares. Mortgages and charges nil.

Electrical Distribution of Yorkshire, Ltd.—Capital, £3,200,000 in £1,200,000 6 per cent. cumulative preference and £1,500,000 ordinary stock and £500,000 unclassified stock. Return dated April 10th. All preference and ordinary stock taken up. £2,700,000 paid. Mortgages and charges: £500,000.

Isle of Thanet Electric Supply Co., Ltd.—Capital, £500,000 in 282,000 6 per cent. preference, 150,000 ordinary and 68,000 unclassified shares of £1. Return dated April 12th. 282,000 preference and 150,000 ordinary shares taken up. £222,000 paid on 222,000 preference shares. £210,000 considered as paid on 60,000 preference and 150,000 ordinary shares. Mortgages and charges: £240,085.

Invincible Electrical Engineering Co., Ltd.—Capital, £1,000 in £1 shares. Return dated January 13th. 400 shares taken up. £400 paid. Mortgages and charges nil.

Alton District Electricity Co., Ltd.—Capital, £35,000 in £1 shares. Return dated March 23rd. All shares taken up. £35,000 paid. Mortgages and charges nil.

Loch Leven Electricity Supply Co., Ltd.—Capital, £10,000 in 1,000 shares of £10 each. Return dated April 4th. 500 shares taken up. £5,000 paid. Mortgages and charges nil.

Mortgages and Charges

Battery Supplies (Electrics), Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated May 15th, 1939, to secure £750. Holder: Mrs. S. Jackson, 114, Lynwood Road, Blackburn.

Electric Time Rentals, Ltd. (formerly Magneta Time Co., Ltd.).—Debenture, charged on hire purchase and rental agreements and company's undertaking and other property, present and future, including uncalled capital, dated May 18th, 1939, to secure amounts due not exceeding £2,500. Holders: Bankers' Commercial Security, Ltd., 39-45, Finsbury Square, E.C.2.

Receivers Released and Appointed

Maxim Lamps, Ltd.—L. V. Smith, of 25/27, Oxford Street, W.1, ceased to act as receiver and manager on May 26th.

F. A. Laws, Ltd.—L. K. Lund, F.C.A., of 52, Grosvenor Gardens, S.W.1, was appointed receiver and manager by order of court dated May 16th, 1939.

Instanta Electric, Ltd. (Instanta Electric Signal-Clocks, Ltd.).—H. J. Townsend, chartered accountant, of 166, Streatham Hill, S.W.2, was appointed receiver and manager on May 17th, 1939, under powers contained in debenture dated July 29th, 1938.

High Vacuum Valve Co., Ltd. (formerly Freedman Valve Company, Ltd.).—D. H. Allan, chartered accountant, of 17, St. Helens Place, E.C., was appointed receiver and manager by Order of Court dated April 4th.

Smith, Warne & Burt, Ltd. (formerly Smith, Warne & Goodsman, Ltd.).—H. P. Carter, of 6/7, Queen Street, E.C.4, was appointed receiver and manager on May 22nd, 1939, under powers contained in debenture dated February 14th.

Reports and Dividends

Callender's Cable Construction Co., Ltd., held its annual meeting on June 2nd. Before proceeding with the business of the meeting, Sir J. Fortescue Flannery, Bt. (chairman), who presided, paid a tribute to the late Sir Thomas Callender, managing director of the company.

Reviewing the past year, he said that he had frequently been able to announce increasing business and consequently higher profits, but on this occasion the vicissitudes of trade had operated and the income for 1938 was considerably less than for 1937. Nevertheless, they had more than sufficient profits to pay a dividend of 15 per cent. for the twentieth year in succession. The international situation, worsened during the year until the crisis in September, with the consequence that the developments they anticipated did not arise, and for many months the demand for supplies from their Erith works was further restricted, and it was only within the last month that a return to more normal conditions had been experienced.

They were satisfied that the large sums expended at their Erith works in the new armouring, testing and packing bays had been justified. These shops covered 3¼ acres in area, and in the new building was assembled the whole of the plant and machinery required to carry out the final stages of cable manufacture after the lead sheath had been applied. Another factor in the reduction of profit was the competition of new companies entering the field of the electrical cable industry during the period when the volume of trade available was reduced.

The substantial balance available would have afforded the payment of a special bonus for 1938 of 5 per cent., as in the two previous years, but the directors considered that in view of the situation to-day it was advisable to conserve resources.

As regarded the general trading of the company, they experienced a heavy demand for their products from abroad during the year and the export business was large. Their trade in Australia and New Zealand for all classes of their manufactures had been maintained. In New Zealand they received, among many others, a substantial order from the Auckland Electric Power Board for "super-tension" cables which had now been delivered and were in process of being laid and jointed. In South Africa their business had been steady and well above the average for the last few years. In addition to the cable and wire which they exported from this country, they were now interested in the cable manufactured in South Africa by the factory associated with the Cable Makers' Association, in which Callender's had a substantial interest.

Business in China during the year was far from easy. In spite of all hindrances to trade, however, a fair amount of orders were secured and executed. In India there was an absence of any large contract, but their level of exports had been well maintained. It was again impossible to secure any substantial orders on the Continent, and similarly the volume of orders from South America was moderate. They had, on the other hand, received many and varied orders from some of the smaller foreign countries and from British Colonies and Protectorates. They had done excellent business in various parts of the Mediterranean and had made shipments to the islands of the Indian Ocean and the Pacific. During the year their engineers were laying and jointing their cables in places as far apart as the West Coast of Africa, Iran and Iraq and China.

They had sold a considerable number of unit-construction bridges and had experienced a growing interest and demand for unit-construction hangars. Their business in ship wiring cables which were manufactured at the Anchor Works, Leigh, continued to improve, and their sales for 1938 were the highest ever recorded. Much of it was for cables required for vessels for the Navy which naturally carried with it some falling off in the demand for cables for ordinary commercial vessels. Nevertheless,

less, they received a number of useful orders, including that for the wiring of the *Dominion Monarch*, in which 160 miles of their cable was installed. In addition, they supplied a large quantity of cable for the new Cunard-White Star liner *Queen Elizabeth*.

Another interesting development was the increase in business of cables for aircraft. As regarded the future, while the beginning of this year was affected by the continuation of the slackness of orders, there had been a substantial improvement in the last month, and at the present time their Erith works were very busy, particularly on the manufacture of cables for "super-tension" transmission. At Erith they were not materially affected by the rearmament programme, although at their Leigh works they were receiving substantial orders in this connection.

Scophony, Ltd.—Presiding at the annual meeting on June 5th, Sir Maurice Bonham-Carter (chairman) said it was an advantage to shareholders that the annual meeting should be held as soon as possible after the close of the financial year, and they had advanced the date of the meeting with the result that there was an interval of five months only since the last meeting. In that period there had been marked progress in the response of the public to television, as shown by the sales of receivers. An important development had been the extension of television to cinemas. They had been entrusted with the equipping of a number of Odeon cinemas in the London television area as well as a number of Monseigneur news theatres, and inquiries had also been received from independent cinemas.

They were now approaching the commencement of their manufacturing activities in the field of home receivers. The "two-foot home receiver" first publicly shown at last year's Radiolympia had been still further improved, and in addition a receiver giving a picture 18-in. by 14-in. for the smaller sized living-room had been evolved.

While to-day television was limited to the London area, an early extension of the service to Birmingham was apparently imminent. They had reached the stage of transmission from purely laboratory developments to the commercial and revenue-earning field, and had every reason to believe that they would establish themselves firmly in the television market. Their present personnel and space facilities were, however, inadequate for manufacturing activities, and in order to be able to fulfil the orders for cinema equipment and to be able to manufacture and market home receivers more finance was required.

The report and accounts were adopted, and a resolution was passed increasing the capital from £300,000 to £500,000 by the creation of 800,000 shares of 5s. each.

The Nigerian Electricity Supply Corporation.—A scheme for raising additional funds has been drawn up. The construction of the new power station below the Jekko Falls and the provision of sub-stations, transformers, &c., imposed a heavy strain on the company's cash resources, and its present liabilities amount to approximately £130,000, of which nearly £100,000 is in respect of loans from bankers.

A scheme has been prepared under which the London Tin Corporation, Ltd., will guarantee the subscription of £60,000 of 6 per cent. redeemable debenture stock at 96 per cent. and will arrange for a credit facility ranking after the debenture stock in the maximum sum of £30,000. The balance of £20,000 of 6 per cent. debenture stock authorised under the present trust deed, and not issued, is to be cancelled. The company will increase its capital by £45,000 to £545,000 by capitalising £45,000 of the preferred ordinary share reserve and issuing bonus ordinary shares of £1 each to preferred ordinary shareholders in the proportion of one share for every ten preferred ordinary share held. Existing preferred ordinary shares are to be converted into ordinary shares of £1 each and the present 200,000 ordinary shares of 5s. each are to be consolidated into 50,000 £1 shares. Cash to be made available to the company under the scheme will amount to approximately £120,000.

The Delhi Electric Supply and Traction Co., Ltd., held its annual meeting on May 31st when Mr. K. A. Scott-Moncrieff (chairman), who presided, said that they added 1,972 new consumers in the year under review. Regarding the bulk supply scheme, the new central authority was financed by the Government and had to provide electricity to them and to others without profit or loss. The exact terms upon which they were to be supplied had yet to be settled, but a provisional arrangement had been come to pending a contract being drawn up.

It had been indicated that they would have to make drastic reductions in their charges, some of which had now been effected, and it had been laid down that the new central authority should have the right to supply in their area consumers whose requirements exceeded 500,000 kWh per annum. The drastic reduction now called for was a serious matter for them, although they hoped it would, in course of time, be to some extent made up by an increase in their output and a reduction in the cost of bulk supply. On that account they thought it advisable to reduce the year's dividend to 10 per cent., tax free, and to augment the amount carried forward. The position regarding the traction side of their business was explained at the last meeting, and nothing further had transpired. The tramway system was being continued, and they were proceeding with the relaying of the track.

The Ever Ready Co. (Great Britain), Ltd., held its annual meeting on June 1st when Mr. M. Goodfellow (chairman and managing director), who presided, said that the price competition in the home market had been an important factor in the health and strength of their business. For many years they had had to meet competition from companies which sold their goods at lower prices, regardless of cost, for the purpose especially of attacking their market. This form of competition during the first three months of the year under review interfered considerably with their sales. They reduced the prices of various goods and with the loyal assistance of their friends in the wholesale and retail trades they not only arrested the fall in sales but by the end of the year had achieved an increase of 5 per cent. in volume. Various unforeseen increases in costs and distribution expenses encountered throughout the year contributed to the fall in profit.

Their competitive policy continued to be successful and sales during April and May, both in volume and value, were substantially in advance of sales of a year ago. The continued threat of war had caused them to put in hand the re-equipment of two old factories previously closed as obsolete. They hoped thereby to be in a position to manufacture and supply goods during any period of emergency.

Telephone Properties, Ltd.—Presiding at the annual meeting held on June 1st Sir Alexander Roger (chairman) said that a net addition of 2,377 telephones, which included 1,207 auxiliary extensions, was recorded by the Nacional Co. of Venezuela, a growth of 12 per cent. Requests for service in certain areas were in excess of available plant capacity and a waiting list of intending subscribers was still in existence. To remedy this position and take care of probable development in the immediate future, works involving a capital expenditure of Bs.1,750,000 were approved and the programme for 1939 covered an additional outlay of Bs.2,100,000. A survey of plant requirements to provide for estimated development during 1940-41 visualised further expenditure of not less than Bs.2,000,000.

A new development in the modern system of communications connecting up the industrial regions of Venezuela was the radio-telephone link recently established between Caracas and Maracaibo. This new service was administered by the Nacional Co. on behalf of the Government.

The Chloride Electrical Storage Co., Ltd., reports a profit for 1938-39 of £324,995, as compared with £435,724 for the preceding year, and a net profit of £258,546 (against £325,679). The ordinary dividend for the year is 15 per cent. (against 20 per cent.), reserve receives £100,000, and the balance carried forward is £80,669 (against £89,149 brought in).

E. K. Cole, Ltd., report a net profit for the year ended March 31st of £11,137, as compared with £17,953 for 1937-38. No ordinary dividend is recommended for the year. For 1937-38 the ordinary dividend was 10 per cent., less tax, and the preferred ordinary shareholders received a participating dividend of 3 per cent., in addition to the cumulative 7 per cent. The directors state that during the past year the radio industry again encountered difficult trading conditions, but the sales turnover in all departments has increased. The Scophony television system, in the development of which the company is interested through its shareholding in Scophony, Ltd., is making excellent progress.

Pye, Ltd., in a preliminary statement, announces a profit for the year ended March 31st of £78,073, as compared with £106,030 for the previous year. The final preferred ordinary dividend is 5 per cent. making 10 per cent., less tax, for the year, and a dividend of 25 per cent. is paid for the year on the deferred ordinary stock. These are at the same rates as for the preceding year.

Broadcast Relay Service, Ltd., reports a balance of trading account for the year ended March 31st of £91,062, as compared with £82,387 in the previons year. Central depreciation reserve receives £30,483, tax £11,839, and the net profit is £48,739 (against £39,504). The final dividend is 7½ per cent., making 12½ per cent. for the year (against 10 per cent.), and £7,613 is carried forward (against £7,305 brought in).

The Postmaster-General announced on March 30th that relay companies' licences would be extended for a further ten years. When this was made public the company acquired the whole of the share capital of two well-established relay businesses and is now in course of acquiring the share capital of a further group of similar companies.

These extensions will involve further capital expenditure. It is proposed to increase the authorised capital by £500,000, of which £300,000 will be 5½ per cent. redeemable cumulative preference shares, and arrangements will be made to issue the new capital in the near future.

The Electric Construction Co., Ltd., in a preliminary statement, reports a net profit for the year ended March 31st of £88,962, as compared with £79,353 in the preceding year. Tax and N.D.C. require £15,000 and the ordinary dividend is raised from 12½ to 13½ per cent. Dividend equalisation and other reserves receive £30,000, and £20,096 is carried forward (against £23,634 brought in).

The British Electric Traction Co., Ltd., reports a total revenue for the year to March 31st of £728,513, as compared with £669,404 in the preceding year, and a net profit of £432,397 (against £446,471). The distribution for the year on the deferred capital is maintained at 15 per cent., and £1,932,724 is carried forward (against £1,721,278 brought in).

The B.E.T. Electric Supply Co. reports a profit for the year to March 1st of £46,828, as compared with £38,449 for the preceding year. Reserve receives £9,413, and the dividend for the year is maintained at 4 per cent., leaving £23,915 to be carried forward (against £16,460 brought in).

The Musselburgh and District Electric Light and Traction Co., Ltd., reports a profit for 1938 of £6,158. The dividend for the year is maintained at 3 per cent., and £3,269 is carried forward (against £2,923 brought in).

The Keith Blackman Co., Ltd., reports a net profit for the year ended March 31st of £32,528, as compared with £55,158 in the previous year. The ordinary dividend for the year is 15 per cent., less tax (against 20 per cent.).

The Morgan Crucible Co., Ltd., earned a trading profit for the fifteen months to March 31st of £543,590, as compared with £552,409 in the preceding twelve months. After providing for depreciation and other charges it is proposed to pay a final dividend of 1s. 2d. per £1 stock, less tax, making 1s. 11d. for fifteen months, and to carry forward £362 (against £104 brought in).

The Revo Electric Co., Ltd., has announced a final dividend of 12½ per cent., maintaining the distribution for the year at 17½ per cent., actual, less tax.

STOCKS AND SHARES

TUESDAY EVENING.

THE course of Stock Exchange business suffers further interference from political uncertainties in connection with the international position. During the past few business days, enterprise has been held in check by a cautious desire to see what will come out of the Russian pact negotiations. Capital had been coming into the Stock Exchange markets, more particularly those of the gilt-edged and industrial sections, with a fair amount of readiness, but this week has shown a disappointing contraction of market activities.

Two new issues of substantial amount—one from the Union of South Africa and the other from Northern Ireland—achieved noticeable success. They were followed by an unexpectedly large amount of Australian 4 per cent. stock, offered at 98½. Upon this, the gilt-edged market became duller, and prices of the popular issues went back fairly sharply after their still more abrupt improvement.

The general trend of industrial prices has followed that of the gilt-edged market, and, at the moment, Stock Exchange conditions are governed by political developments.

Edmundsons

Edmundsons Corporation ordinary shares have strengthened to 26s. 6d. since last week's meeting. The chairman was able to disclose all-round expansion. Consolidation was carried a stage further with the liquidation of eighteen separate subsidiaries; and another six are undergoing a similar process. At its conclusion, the policy will leave the group in the compact form of the parent concern, with not more than ten directly-owned operating subsidiaries. Generally speaking, investors look for a rather higher yield on the shares of the electricity holding companies than on those of the purely operating concerns. But the return of 4½ per cent. on Edmundsons reflects the high esteem in which the shares are held.

For the successful progress of the Edmundsons group, little thanks is owing, it seems, to the Government's policy—or lack of it—in connection with the electricity supply industry. Reproof administered by Sir Thomas Royden at the Edmundsons' meeting was restrained, but none the less firm. Delay, said he, is multiplying the difficulties in the way of the efficient production and supply of electricity. Reference was made to the appointment and postponement of the Committee of the House of Lords inquiry. While doubtful, in any case, about the desirability of the inquiry, the chairman described this piecemeal method of approach as merely adding to the confusion. The past week has seen improvements here and there in the market for electricity supply shares, Electricity Supply Corporations being up by 1s. at 47s. 6d., ex-dividend, and Scottish Power by 1s. 3d., at 36s. 3d.

A Month's Changes

The following table gives an idea of how shares in the various electrical groups have taken part in the all-round improvement of markets since a month ago :—

STOCK OR SHARE	May 2nd	June 4th	Rise
Central Elec. Board 5 p.c. 1950*70	106	109	3
L.P.T.B. "C" Stock	64½	79½	15
B.E.T. Deferred	800	1025	225
Southern Rly. Preferred	60½	75	14½
County of London Elec.	42/–	44/6	2/6
Midland Counties	37/–	38/9	1/9
Edmundsons	24/–	26/6	2/6
Cable & Wireless Ord.	42½	54½	12
Cable & Wireless Pref.	82½	95½	13
Marconi Marine	26/3	30/–	3/9
General Electric	77/6	80/–	2/6
Associated Elec. Ind.	37/6	39/–	1/6
Crompton Parkinson	17/6	20/–	2/6
English Electric	32/6	36/–	3/6
Johnson & Phillips	37/6	41/3	3/9
Siemens	22/6	25/–	2/6
Automatic Tel. & Elec.	42/6	47/6	5/–

The first of the two dates above fell shortly after the Budget and Herr Hitler's reply to Mr. Roosevelt. In a number of instances, prices are at or near the highest points of the year.

British Electric Traction Reserves

It is an axiom by now that dividends count for next to nothing where British Electric Traction deferred stock is concerned. With the stock quoted at over 1000, the yield on the 5 per cent. cash payments could be obtained from money on deposit at a bank. Matters which count are, of course, the 10 per cent. scrip bonuses distributed each year, and the impressive proportions of the reserve funds. These have been further strengthened out of the profits for 1938-9, which, as the full accounts now confirm, pursued without interruption their upward way. It is the balance sheet, however, rather than the profits statement, which mostly catches the eye. Against an issued deferred capital of £718,900 stands a general reserve of £520,000 and an undivided profits account of close on £2 millions. Many people, moreover, detect reserves hidden in the valuation of the investments. These stand in the books at £6,116,000, and are calculated to be worth a great deal more.

Again, the interest in Birmingham and District Investment has a market value little short of double the balance-sheet figure of £870,000. In 1932 the company gave a scrip bonus of 100 per cent. In the present financial position is justification enough for expectation of another "plum" before long.

Equipment and Manufacture

Callender's Cable shares are recovering from the upset occasioned by last month's dividend announcement. Following a gain of 1s. 3d. in the previous week, the shares have put on the same amount again to 68s. 9d., after being 70s. at one time. Johnson & Phillips did better with a rise of 3s. 9d. to 41s. 3d., while improvements in Enfields, at 53s. 9d., and British Insulated, at 4½, give the cables group a healthy look. Elsewhere, General Electrics and Associated Electrical Industries stayed where they were, but advances in other directions kept the market well in the running with the pace of industrials. In the telephone group, Ericssons at 42s. 6d. and Automatic Telephones at 47s. 6d. are each 1s. 3d. to the good, while Telephone Manufacturing are 6d. up at 9s. 6d. Aron Meters have come to life with an improvement of 1s. 3d. to 30s., and J. Lucas put on the same amount to 58s. 9d. Lancashire Dynamos are up 2s. 6d. to 3½. Among the more general engineering issues, Westinghouse Brakes at 51s. 3d., and International Combustions at 5⅛ are each 5s. better. Chloride Electrical Storage recovered deduction of the dividend at 3¼, after publication of the full accounts. Ever Readys at 19s. 6d. were unaltered after the meeting.

Brazilian Developments

In a statement made by the Under Secretary for Foreign Affairs in the House of Commons last Monday, it was notified that Brazil has informed the British Ambassador at Rio of the Brazilian Government's hope to reduce debt by payments abroad. An announcement on the point is expected towards the end of this month. The British Ambassador was assured that all creditors would receive equal treatment.

This statement had a salutary effect upon the prices of Brazilian Government bonds. It exercised no particular influence upon Brazilian Tractions, because the price of the latter had already been advanced, as mentioned here previously, on the expectation that, if Brazil were to make a genuine effort to meet her foreign obligations, this would obliquely imply her willingness to allow the Traction Company to take money out of the country, and to distribute it as dividends to the Traction Company's shareholders. Moreover, this advance by Brazil along the path of international morality, is hailed as a possible precursor of similar action on the part of other foreign states.

Electrical Equipment Dividends

The Electric Construction Company provided the event of the week in the market for electrical equipment shares. On news of the 1 per cent. increase in the distribution to 13½ per cent. (which includes 3½ per cent. as bonus) the price of the ordinary shares advanced no less than 5s. to 42s. 6d., but reacted later to 37s. 6d., ex-dividend. According to the preliminary figures, net profits are up from £79,400 to £89,000. The yield on the shares works out at 7.2 per cent. on the new rate of payment. Revo Electric is paying 17½ per cent.—for the third consecutive year—on the ordinary capital as increased by last year's 5 per cent. share bonus. In this instance, expectations appear to have been pitched over-optimistically, for the shares have been marked down by 3s. 9d. during the past fortnight. The yield comes to 6 per cent.

Radio

Radio manufacturers were known to have had a hard experience last year, on account both of the restraints on the public willingness to spend, and of the close competition within the trade itself. Consequently expectation has been prepared for a setback in the results of the companies concerned. Of these, E. K. Cole reports a net profit of half the previous figure, and is paying nothing on the ordinary shares against last year's 10 per cent. dividend. That payment, however, was not covered by earnings. The 5s. shares have fallen 6d. to their par value. The report refers to excellent progress by Scophony, in which "Ekcos" have an important stake. Profits of the Pye Company have fallen from £106,000 to £78,000, but the 25 per cent. dividend on the deferred shares represents a maintenance of the same rate as has been paid for seven consecutive years. The 5s. shares rose 1s. to 10s. 6d. ex-dividend, on the news, the yield at this price being close on 12 per cent. Broadcast Relays shares, which have seen growing popularity since the extension of the operating licence, are the object of some activity around 10s. 6d., by reason of the increase in the dividend from 10 to 12½ per cent., and the news of expansion involving the acquisition of other similar undertakings. "Emmies" have remained dull at about 11s. since the changes in the management were made known.

Miscellaneous Matters

London Transport "C" Stock, at 79½, has lost 3 of the 11 points rise which signalised the success of the railway's claim for an increase in London fares. Profit-taking probably has more to do with the reaction than the criticisms directed—not always accurately—against the decision. Southern Railway 5 per cent. preferred stock—the other issue concerned most directly with the fare increase—has lost only half a point, to 75, after the previous 6 points rise. The 5 per cent. preference has advanced further to within half a point of par. Cable and Wireless issues hold tenaciously to their higher prices, while Globe Telegraph ordinary, at 31s. 3d., and the preference, at 26s. 3d., are both 1s. 3d. to the good. Marconi Marines, at 30s., are well clear of the previously best price of the year. Despite the reactionary tendency of the gilt-edged market, Central Electricity Board stocks and the senior London Transport Board issues are mostly harder.

ELECTRICAL COMPANIES' SHARES

Prices, Dividends and Yields

Company	1939 High-est	1939 Low-est	Dividend Pre-vious	Dividend Last	Price June 6	Rise or Fall	Yield £ s. d.
Home Electricity Companies							
Bournemouth and Poole	68/3	63/9	15	15	65/-	--	4 12 4
British Power & Light	30/9	26/-	7	7	28/6	—	4 18 3
City of London	33/9	31/-	7½	7½	32/-	—	4 2 6
Clyde Valley	37/9	34/-	8	8	37/6	—	4 8 2
County of London	46/9	41/9	10½	10½	44/6	—	4 14 2
Edmundson's:							
7% Pref.	31/6	30/-	7	7	31/-	—	4 10 4
Ord.	27/9	23/-	9	6	26/6	+1/6	4 10 7
Elec. Dis. Yorkshire	41/6	37/9	9	9	38/9	—	4 12 9
Elec. Fin. and Securities	47/9	45/-	12½	12½	47/6xd.	+1/-	5 5 3
Elec. Supply Corporation	51/9	48/-	12	12	49/-	+2/-	4 18 0
Isle of Thanet	20/-	18/6	4	4	18/6	—	4 6 6
Lancs Light and Power	34/6	29/-	7½	7½	31/3	—	4 16 0
Llanelly Elec.	22/6	21/-	5½	5½	21/-	—	5 4 9
Lond. Assoc. Electric	29/3	26/3	7	7	26/3	—	5 6 8
London Electric	34/3	32/-	7	7	33/-	—	4 4 10
London Power Deb. Red.	106½	102½	5	5	103½	+1	4 17 6
Metropolitan	51/-	45/3	12	12	47/6	—	5 1 0
Midland Counties	38/9	34/-	8	8	38/9	+9d.	4 2 7
Mid. Elec. Power	41/9	38/3	8	9	38/9	—	4 13 0
Newcastle Elec.	28/9	26/6	7	7	27/-	—	5 3 8
North Eastern Electric:							
Ordinary	32/3	28/6	7	7	30/6	+6d.	4 11 10
7% Pref.	32/6	30/-	7	7	31/6	—	4 9 0
Northampton	48/-	45/-	10	10	47/6	—	4 4 2
Notting Hill 6% Pref. (£10)	13½	13	6	6	13	—	4 12 4
Northmet Power							
Ordinary	46/6	41/6	10	10	44/6	—	4 10 0
6% Pref.	29/-	27/6	6	6	27/6	—	4 7 3
Richmond Elec.	29/-	27/3	7	7	27/6	—	5 1 10
Scottish Power	38/9	33/9	8	8	36/3	+⅛	4 8 2
Southern Areas	22/9	19/6	4½	5	20/6	—	4 17 7
South London	30/9	28/-	7	7	28/-	—	5 0 0
West Devon	23/3	22/6	5	5	22/6	—	4 9 0
West Glos.	21/3	18/-	2	2½	18/6	—	2 14 1
Yorkshire Elec.	38/6	34/9	8	8	37/-	—	4 6 6
Overseas Electricity Companies							
Atlas Elec.	4/3	2/-	Nil	Nil	2/9	—	—
Calcutta Elec.	39/-	34/6	10*	10*	35/-	+6d.	—
Cawnpore Elec.	34/6	28/3	10	10	28/3	—	7 1 7
East African Power	26/3	22/6	7	7	24/-	—	5 16 8
Jerusalem Elec.	24/6	23/3	5	6	24/-	—	5 0 0
Kalgoorlie (10/-)	10/6	9/6	7½	7	10/3	—	7 6 4
Madras	31/-	28/6	8*	8*	26/3	—	5 6 2
Montreal Power	34½	31	1½	1½	34	+½	—
Palestine Elec. "A"	29/6	26/3	7½*	7½*	26/3	—	5 14 1
Perak Hydro-electric	18/9	15/-	7	6	15/9	+9d.	7 12 4
Shawinigan Power	23½	20	85cts.	83cts.	20¾	−½	—
Tokyo Elec. 6%	61	50	6	6	51½	—	11 13 6
Victoria Falls Power	72/-	60/-	12	13½	70/-	+⅛	3 17 2
Whitehall Investments Pref.	19/6	16/-	7½	7½	18/-	+6d.	8 6 8
Public Boards							
Central Electricity:							
1950–70	112	106	5	5	109	+½	4 11 2
1955–75	115½	108	5	5	110	+1	4 11 0
1951–73	106½	103½	4½	4½	104½xd.	+1	4 6 2
1963–93	95½	86	3½	3½	90½	+1½	3 17 4
London Elec. Trans. Gtd.	88½	84	2½	2½	86½	—	2 17 6
London & Home Counties,							
1955–75	107½	106½	4½	4½	107	—	4 4 1
Lond. Passenger Transport:							
A	114½	104¾	4½	4½	109½	+1	4 2 2
B	117½	105	5	5	112½	—	4 9 0
C	83½	64½	4½	4	79½	−3	5 0 8
West Midlands Joint Elec.,							
1948–68	112½	109	5	5	108½	—	4 12 2
Telegraph and Telephone							
American Tel. & Tel.	180	159	9	9	176½	—	5 2 0
Anglo-Am. Tel.:							
Pref.	101½	89½	6	6	94½	+1	6 7 0
Def.	23¾	19	1½	1½	22½	+1	6 16 4
Anglo-Portuguese	24/-	19/9	8	8	21/3	—	7 10 7
Cable & Wireless:							
5½% Pref.	95½	75	4½	5½	95½	—	5 15 2
Ord.	55	34	4	4	54½	—	7 6 10
Income	100	95½	—	—	97xd.	+1	4 2 6
Canadian Marconi $1	5/3	3/9	—	Nil	4/9	—	—
Globe Tel. & Tel.:							
Ord.	31/3	23/6	5½*	7½*	31/3	+⅛	4 16 0
Pref.	26/9	23/3	6	6	26/3	+⅛	4 11 5
Great Northern Tel. (£10)	38	27½	20	20	32½	—	6 3 1
Inter. Tel. & Tel.	10½	7½	Nil	Nil	8	—	—
Marconi-Marine	30/-	23/-	7½	10	30/-	+1/9	6 13 4
Oriental Telephone Ord.	2½	46/3	12*	12*	2⅞	—	4 16 0
Radio Corpn.	8⅞	6	8	6	7	—	—
Telephone Props.	14/-	12/9	5	6	13/9	—	8 14 6
Telephone Rentals (5/-)	10/-	8/6	5	6	9/6xd.	+3d.	3 3 2
Western Union	25½	19½	2¾	—	22½	+2	—
Traction and Transport							
Anglo-Arg. Trams:							
First Pref. (£5)	7/6	3/6	Nil	Nil	7/6	—	—
4% Inc.	16	7	Nil	Nil	15	+2	—
British Electric Traction:							
Def. Ord.	1025	700	5	5	1025	—	—
Pref. Ord.	164	158	8	8	153	+3	5 4 8
Bristol Trams	48/6	37/3	8	10	47/6	+½	4 4 3
Brazil Traction	13	7⅛	$1	—	11	—	—
Calcutta Trams	25/6	23/6	8	8	23/-	—	6 19 2
Cape Elec. Trams	18/-	16/9	5	6	17/6	—	6 17 2
Lancs Transport	36/6	32/6	10	10	32/6	—	6 3 1
Mexican Light:							
1st Bonds	25	21	5	5	25	—	—
Rio 5% Bonds	81	47	5	5	70	—	7 2 10
Southern Rly:							
5% Prefd.	75½	48	5	5	75	−½	6 13 4
5% Pref.	90½	80	5	5	90½	+1	5 0 6
T. Tilling	48/3	39/6	10	10	48/3	—	4 3 0
Tilling & B.A.	53/-	50/-	10	9*	52/6	—	3 8 7
West Riding	37/9	31/3	10	10	36/3	—	—
Equipment and Manufacturing							
Aron Electricity Ord.	32/3	28/9	15	15	30/-	+⅛	10 0 0
Assoc. Elec.:							
Ord.	45/3	34/9	10	10	39/-	—	5 2 7
Pref.	36/6	34/-	8	8	33/9xd.	+6d.	4 11 10
Automatic Telephone & El.	46/6	39/3	10	12½	47/6	+⅛	5 5 3
Babcock & Wilcox	42/9	37/-	10	12½	45/-	+6d.	5 11 1
British Aluminium Ord.	58/3	48/9	12½	12½	58/3	—	4 6 0
British Insulated Ord.	88/-	77/-	20	20	4½	+⅛	4 17 0
British Thermostat (5/-)	16/-	12/-	18½	18½	13/9	+6d.	6 14 7
British Vacuum Cleaner (5/-)	22/6	18/6	40	40	15/-xd.	−1/-	—
Brush Ord.	5/9	4/6	Nil	Nil	5/3	+3d.	—
Callender's	92/-	67/6	20	15	68/9xd.	+⅛	4 7 3
Chloride Elec. Storage	82/3	65/-	20	15	3½xd.	+1/6	4 12 4
Consolidated Signal	96/-	80/9	36½	36½	82/6	—	8 16 9
Crabtree (10/-)	25/6	21/6	17½	17½	23/9	+⅛	7 7 4
Crompton Parkinson:							
Ord. (5/-)	21/-	14/9	12½	15	20/-xd.	+3d.	—
E. K. Cole (5/-)	9/-	4/-	10	Nil	5/-	−6d.	—
Elec. & Musical Industries							
(10/-)	14/9	8/9	10	5	11/-	−3d.	4 1 0
Electric Construction	38/6	30/6	12½	13½	37/6xd.	+2/-	7 4 0
Enfield Cable Ord.	58/6	2½	25	16½	53/9	+⅛	6 0 10
Electrical Switchgear (10/-)	27/-	23/9	16	16	23/9	—	6 14 9
English Electric	36/-	30/3	10	10	36/-	+9d.	5 11 1
Ensign Lamps (5/-)	14/6	13/9	—	25	14/6	—	8 12 4
Ericsson Tel. (5/-)	43/-	35/-	25*	25*	42/6	+⅛	2 19 0
Ever Ready (5/-)	24/-	19/3	35	30	19/6	—	7 14 0
Falk Stadelmann	27/-	22/6	10	10	22/6	—	8 18 0
Ferranti Pref.	25/6	23/6	7	7	23/-	—	6 1 9
G.E.C.:							
Pref.	31/9	29/3	6½	6½	30/-	+⅛	4 6 8
Ord.	82/-	70/9	17½	20	80/-	—	5 0 0
Greenwood & Batley	27/6	24/6	7	15	27/6	+⅛	10 18 3
Hall Telephone (10/-)	22/3	19/3	15	15	21/3	—	7 1 2
Henley's (5/-)	21/-	17/9	20	20	18/9	—	5 6 8
4½% Pref.	23/-	21/6	4½	4½	22/6	—	4 0 0
Hopkinsons	46/3	37/3	12½	15	46/3	—	6 9 10
India-Rubber Pref.	21/-	20/-	5½	5½	21/3	—	5 3 6
Intl. Combustion	117/-	97/-	32½	32½	5 10	+¼	5 11 9
J. Lucas	60/-	52/-	15	15	58/9	+⅛	5 2 0
Johnson & Phillips	41/3	32/-	12½	12½	41/3	+⅜	6 1 4
Lancashire Dynamo	68/-	60/-	25	25	62/6	+½	8 0 0
Laurence Scott (5/-)	12/-	10/-	15	15	11/-	—	6 16 4
London Elec. Wire	31/6	29/-	12	7½	29/6	—	5 1 8
Mather & Platt	50/-	42/6	13½	13½	47/6	—	5 17 0
Metropolitan Elec. Cable Pf.	21/3	21/-	5½	5½	21/3xd.	+6d.	5 3 6
Murex	85/9	63/9	20	20	4	−⅛	5 0 0
Pye Deferred (5/-)	13/9	7/6	25	25	10/6xd.	+1/-	11 18 2
Revo (10/-)	35/6	31/-	17½	17½	29/-xd.	−1/-	6 0 8
Reyrolle	61/-	52/6	12½	12½	56/3	—	4 9 0
Siemens Ord.	26/9	20/6	7½	7½	25/-	—	6 0 0
Strand Elec. (5/-)	5/6	4/9	5	10	5/-	—	10 0 0
S. Smith (1/-)	9/9	6/-	37½	50	8/9	—	5 14 3
Switchgear & Cowans (5/-)	15/-	11/3	20	20	11/3	—	8 18 0
Telegraph Condenser (10/-)	7/6	5/-	5	—	7/6	—	—
Telegraph Construction	2½	37/6	10	10	37/6	—	5 6 8
Telephone Mfg. (5/-)	10/-	8/-	9	9	9/6	+6d.	4 14 9
Tube Investments	91/-	82/9	23¾	23¾	90/6	—	5 6 2
Vactric (5/-)	4/3	2/3	10	4	2/6	—	8 0 0
Vickers (10/-)	24/6	19/6	10	10	20/-	−6d.	5 0 0
Westinghouse Brake	54/9	43/9	17½	17½	51/3	+½	6 16 6
Walsall Conduits (4/-)	31/9	24/-	55	55	27/6	+6d.	8 0 0
West, Allen (5/-)	7/6	5/9	7½	10	6/9	+3d.	7 8 2

* Dividends are paid free of Income Tax.

NEW PATENTS

Electrical Specifications Recently Published

Compiled by a firm of chartered patent agents. The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1937

21716. "Cathode-ray deflection." Radioakt.-Ges. D. S. Loewe. August 12th, 1936. (505355.)

27335. "Fittings for supporting and conveying current to electric lamps." A. J. Ensor. October 8th, 1937. (505361.)

27557. "Cathode-ray tube television and like apparatus." E. L. C. White, and C. L. Faudell. October 11th, 1937. (Cognate application, 2084/38.) (505490.)

30063. "Luminescent signs or the like." G. D. Skinner & Benjamin Electric, Ltd. November 3rd, 1937. (Cognate application 3924/38.) (505432.)

30378. "Electric wave amplifying systems." Standard Telephones & Cables, Ltd. December 5th, 1936. (505492.)

30531. "Circuits for the operation of electrical switches." B. M. Hadfield. November 8th, 1937. (505436.)

30614. "Plates of lead accumulators." Compagnie Générale d'Electricité. November 28th, 1936. (505438.)

30710. "Electric furnaces." Magnesium Metal Corporation, Ltd. (American Magnesium Metals Corporation). November 9th, 1937. (505617.)

30725. "Overload protective arrangements for interference-preventing devices associated with electrical apparatus and machines." Siemens & Halske Akt.-Ges. November 9th, 1936. (505367.)

30736. "Electrical communication systems." Standard Telephones & Cables, Ltd., and R. A. Meers. November 9th, 1937. (505370.)

30793. "Fuse-carriers for electric fuses." Sykes & Dyson, Ltd., P. Sykes, and F. J. Griffith. November 10th, 1937. (505284.)

30796. "Electron-discharge devices more particularly for television transmission systems." H. G. Lubszynski, and J. D. McGee. November 10th, 1937. (505618.)

30884. "Electric motors more particularly for fans." General Electric Co., Ltd., and H. J. Eley. November 10th, 1937. (505373.)

30886. "Electric motor control systems." General Electric Co., Ltd., and H. J. Coates. November 10th, 1937. (505374.)

30897. "Thermostatic electric switches." Diamond H Switches, Ltd., and C. A. Turner. November 10th, 1937. (505621.)

30899. "Arrangements for eliminating interference from the ignition circuits of internal-combustion engines." Siemens Apparate und Maschinen Ges. November 14th, 1936. (505622.)

30955. "Amplifier arrangements for television purposes." Radioakt.-Ges. D. S. Loewe. November 12th, 1936. (505448.)

30993. "Electric heating tools such as soldering-irons." Bryce, Ltd., and G. Colley. November 11th, 1937. (505505.)

30998. "Automatic telephone systems." Telefonaktiebolaget L. M. Ericsson. November 14th, 1936. (505506.)

31046. "Electrical signalling systems." Automatic Telephone Electric Co., Ltd., and W. Saville. November 11th, 1937. (505509.)

31085. "Electric brakes." H. List. November 12th, 1937. (505568.)

31086. "Electric motors." H. List. November 12th, 1937. (505569.)

31092. "Arc gaps for protecting electric power supply systems." A. Reyrolle & Co., Ltd., B. H. Leeson, and H. Leyburn. November 12th, 1937. (505570.)

31145. "Cathode-ray tubes." F. B. Dehn. (Hygrade Sylvania Corporation.) November 12th, 1937. (505632.)

31155. "Electric signalling systems." Automatic Telephone & Electric Co., Ltd., T. B. D. Terroni, J. B. McCusker. November 12th, 1937. (505576.)

31173. "Electric motors." British Thomson-Houston Co., Ltd. November 13th, 1936. (505583.)

31177. "Electrical tube - welding machine." L. N. Reddie (Faradit Rohr- und Walzwerk Akt.-Ges.). November 12th, 1937. ((505585.)

31180. "Arrangements for supplying electric-discharge tubes and the like with alternating current.' Soc. Anon. pour les applications de l'Electricité et des Gaz Rares Etablissements Claude-Paz & Silva. August 24th, 1937. (505586.)

31181. "Lighting installations for high-tension cables." Soc. Anon. pour les Applications de l'Electricité et des Gaz Rares Etablissements Claude-Paz & Silva. October 7th, 1937. (505587.)

31182. "Electric motor control systems." J. U. F. Andersen. November 12th, 1937. (505634.)

31238. "Electric control systems for power-actuated movable objects." N. Japolsky. November 13th, 1937. (505511.)

31317. "Automatic tuning devices for radio receivers." Telefunken Ges. für Drahtlose Telegraphie. November 14th, 1936. (505598.)

31330. "Electron lenses." Zeiss Ikon Akt.-Ges. December 18th, 1936. (505601.)

31343. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., and A. Allan. November 15th, 1937. (505638.)

31344. "Liquid-insulated electric circuit-breakers." A. Reyrolle & Co., Ltd., and A. Allan. November 15th, 1937. (Cognate application 30578/38). (505603.)

31345. "Electric switchgear." A. Reyrolle & Co., Ltd., W. J. Dean, and M. Clothier (legal representatives of H. W. Clothier, dec.) and A. Allan. November 15th, 1937. (Cognate application 31346/37.) (505604.)

31347. "Electric switchgear having liquid-insulated circuit-breakers." A. Reyrolle & Co., Ltd., and A. Allan, W. J. Dean, and M. Clothier (legal representatives of H. W. Clothier, dec.). November 15th, 1937. (505605.)

31349. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., and A. Allan, W. J. Dean, and M. Clothier (legal representatives of H. W. Clothier, dec.) November 15th, 1937. (505606.)

31350. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., and A. Allan, W. J. Dean, and M. Clothier. (Legal representatives of H. W. Clothier, dec.) November 15th, 1937. (505607.)

31363. "Electric motor control." British Thomson-Houston Co., Ltd., and B. Adkins. November 15th, 1937. (505609.)

31379. "Electric arc lamps." Korting & Mathiesen Akt.-Ges. December 28th, 1936. (505610.)

31697. "Electric thermal switches." Bulpitt & Sons, Ltd., and W. H. Bulpitt. November 18th, 1937. (505613.)

32131. "Visible magnification of objects in electron-optical manner." Zeiss Ikon Akt.-Ges. November 20th, 1936. (505380.)

32270. "Cathode-ray scanning method for television and like purposes." G. Weiss. November 24th, 1936. (505453.)

34608. "Fusible electric cut-out elements." English Electric Co., Ltd., and A. M. Pooley. December 14th, 1937. (505388.)

1938

3223. "Method of and means for sintering or fritting refractory linings by means of an electric arc." A. L. Sadler (Pittsburgh Lectromelt Furnace Corporation). February 2nd, 1938. (Cognate application 1833/39.) (505292.)

5168. "Electric voltage regulators." Standard Telephones & Cables, Ltd. March 20th, 1937. (505298.)

6265. "Arrangements for supplying direct-current electric circuits from three-phase alternating-current electric circuits." General Electric Co., Ltd., R. Rudenberg, and H. H. Taylour. February 28th, 1938. (505301.)

10048. "X-ray tubes." British Thomson-Houston Co., Ltd. April 1st, 1937. (505394.)

10825. "Electrically starting internal-combustion engines or the like." J. V. Gil, and Kohler Co., Ltd. April 8th, 1936. (505306.)

13615. "High-frequency radio repeater." Standard Telephones & Cables, Ltd. June 15th, 1937. (505400.)

15617. "Lighting fittings adapted to take a high - pressure metal - vapour electric-discharge lamp and comprising means for establishing a magnetic field in its neighbourhood." General Electric Co., Ltd., and J. B. S. Smyth. May 25th, 1938. (505527.)

16527. "Radio direction-finding apparatus." C. Lorenz Akt.-Ges. June 2nd, 1937. (505405.)

18505. "Gas or vapour filled electric-discharge tubes for use in relay circuits." Aktiebolaget Elektrod. June 25th, 1937. (505529.)

20193. "Electric high-pressure metal vapour discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 10th, 1937. (505328.)

20310. "Electric heating resistors of bar form." Siemens-Planiawerke Akt. Ges. für Kohlefabrikate. November 20th, 1937. (505531.)

21460. "Electrical apparatus for the supervision of machine tools." Patentverwertungs-Ges. Hermes. January 26th, 1938. (505532.)

23599. "Electrically controlled copying systems for milling and like machines." British Thomson-Houston Co., Ltd. August 13th, 1937. (505470.)

25158. "Adjustable inductance devices." Standard Telephones & Cables, Ltd. September 9th, 1937. (505337.)

26590. "Coreless induction furnaces." Heraeus - Vacuumschmelze Akt. - Ges. October 22nd, 1937. (505412.)

26848. "Electric-discharge devices." British Thomson-Houston Co., Ltd. September 16th, 1937. (505474.)

28030. "Device for operating and locking a part movable around an axis and submitted to electro-magnetic forces." Soc. l'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procédés G. Claude. July 12th, 1938. (505538.)

28892. "Electric armature insulation." Hoover, Ltd. October 25th, 1937. (505477.)

33098. "Dynamo-electric machines." Ercole Marelli & Cie Soc. Anon. June 8th, 1938. (505545.)

33357. "Radio direction finders." Telefunken Ges. für Drahtlose Telegraphie. November 16th, 1937. (505547.)

34435. "Snap-action electric switches." Burgess Products Co., Ltd. November 26th, 1937. (505549.)

37526. "Frequency - dividers." Telefunken Ges. für Drahtlose Telegraphie. December 23rd, 1937. (505352.)

1939

2780. "Magnetrons." Telefunken Ges. für Drahtlose Telegraphie. January 26th, 1938. (505426.)

TRADE MARK APPLICATIONS

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from May 31st.

Traffoblak. No. 606394. Class 2 (IV). Lacquers, paints and varnishes (not being insulating varnishes).—Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.

Facilend. No. 604288. Class 9 (IV). Electric arc welding apparatus and electrodes therefor.—La Société La Soudure Electrique Autogène, Brussels, Belgium (British representatives, Gill, Jennings and Every, 51-52, Chancery Lane, London, W.C.2.).

Secraphone. No. 605388. Class 9 (IV). Telephonic apparatus for installation in buildings, but not including radio receivers.—Telephone Manufacturing Co., Ltd., Hollingsworth Works, Martell Road, West Dulwich, S.E.21.

Insulap (lettering and design). No. 605442. Class 17 (IV). Electrical insulating tape and electrical insulating compounds.—Industrial Insulations, Ltd., Works Road, Letchworth, Herts.

CONTRACT INFORMATION

Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Aldershot.—July 4th. Electricity Department. One three-panel, metal-clad, 6,600-V switchboard. (June 2nd.)

Argentina.—BUENOS AIRES.—June 16th. Oilfields Department. Electric generators and motors. (T.Y. 23047/39.)*

Australia.—VICTORIA.—June 27th. State Electricity Commission. V.i.r. copper cable. (T. 22826/39.)*

MELBOURNE.—July 4th. Posts and Telegraph Department. Switchboard and instrument plugs. (T. 22674/39.)*

Power ringing machines. (T.Y. 23259/1939.)*

BRISBANE.—July 11th. City Electric Light Co., Ltd. Land and submarine cables. (T. 22823/39.)*

Berkshire.—June 16th. County Council. Electric lighting installation at Newbury Public Assistance Institution. (May 26th.)

Bexley.—June 21st. Borough Council. P.i. underground cables for twelve months. (See this issue.)

Bingley.—July 3rd. Electricity Department. One 500-kVA transformer. (See this issue.)

Birmingham. — June 12th. Electric Supply Department. Four electric cranes at Hams Hall "B" power station. (May 26th.)

June 26th. Domestic electrical apparatus for twelve months. (June 2nd.)

June 28th. Electro-static flue-gas cleaning plant at Hams Hall "B" power station. (June 2nd.)

July 10th. Two ferro-concrete cooling towers at Hams Hall "B" power station. (May 26th.)

June 13th. Salvage Department. Nineteen electric battery-driven vehicles. General manager, 161, Corporation Street. (Deposit £1 1s.).

Blackpool.—June 21st. Gas Department. 400-kW, 3-wire light and power mercury-arc rectifier sub-station equipment. (See this issue.)

Cardiff.—July 3rd. Electricity Department. 6,600-V and 33,000-V sub-station switchgear, three 7,500-kVA transformers, and cable. (June 2nd.)

Cheadle and Gatley.—June 12th. Electricity Department. Extensions to 6.6-kV switchgear at the Cheadle main sub-station. (May 26th.)

June 19th. Extensions to 6.6-kV switchgear and one 600-kVA transformer for Torkington estate sub-station. (June 2nd.)

Chesterfield. — June 16th. Borough Council. Thirteen miles of medium pressure, p.i., lead-covered and steel armoured cables. (See this issue.)

Consett.—U.D.C. Installation of electric lighting in 246 houses on the various estates. Plans by T. Hutton, surveyor.

Darlington.—June 21st. Electricity Department. 194 mercury-vapour electric-discharge street lamps. (See this issue.)

Exeter.—June 15th. Corporation. Installation of electric lighting in twenty-six houses on the Wonford estate. J. Bennett, city architect.

Falkirk.—June 24th. Electricity Department. One cooling tower and one steam generating unit. (See this issue.)

Gellygaer.—June 17th. U.D.C. Transformers and extra-high and low-voltage switchgear. (June 2nd.)

Hawick.—June 12th. Town Council. Electrical work at thirty houses at Havelock Street estate. Town Clerk.

Herefordshire. — June 10th. County Council. One bed-lift and one trolley lift at Hereford Institution. (June 2nd.)

Huddersfield.—June 12th. Electricity Department. Complete electric goods lift installation. (May 26th.)

India.—SIMLA.—June 15th. Railway carriage electric fans, regulators, &c., for N.W. Railway. (T. 22948/39.)*

June 15th. 5,000 porcelain, disc cap and pin type insulators, suitable for 110-kV transmission lines. (T. 22946/39.)*

Kirkcaldy.—June 12th. Corporation. Electric lighting at Fergus Wynd housing estate (twelve houses). Town Clerk.

London.—H.M. OFFICE OF WORKS.—June 13th. Installation of high- and low-voltage cables and control gear at the National Physical Laboratory, Teddington. (May 26th.)

METROPOLITAN WATER BOARD.—June 26th. Stores, including electric lamps, for twelve months. 173, Rosebery Avenue, E.C.1.

Mansfield.—July 3rd. Electricity Department. Three voltage regulating transformers and one seven-panel remote controlled switchboard. (See this issue.)

New Zealand. — WELLINGTON. — June 28th. Post and Telegraph Department. 5,000-ft. of cable. (T. 22770/39.)*

July 7th. Battery plates. (T. 23024/1939.)*

July 20th. Two single-channel carrier telephone systems. (T. 23029/1939.)*

June 27th. Public Works Department. Two electric cranes and two electric hoist blocks. (T. 22774/39.)*

July 4th. Four 150-kVA single-phase transformers. (T. 22772/39.)*

July 4th. Distribution switchboard for R.N.Z.A.F. Station, Blenheim. (T. 22773/39.)*

July 11th. Outdoor switchgear for 11-kV distribution lines at Waikaremoana main station. (T. 22768/39.)*

Nottingham.—June 13th. Electricity Undertaking. General stores for twelve months. (May 26th.)

Plymouth. — June 24th. Electricity Supply Department. Valve and cast-iron pipes for circulating water system, de-superheater and reducing valve equipment, high-pressure steam and water pipework and distribution switchgear, starters and motors for boiler and turbine auxiliaries. (June 2nd.)

Portslade-by-Sea.—June 16th. U.D.C. Street-lighting installation. (June 2nd.)

Portsmouth.—June 19th. Electricity Undertaking. P.i. and rubber-insulated cables for six months. (See this issue.)

Reigate.—June 17th. Electricity Department. Rewinding motors, temporary plant and wiring of power circuits. (June 2nd.)

Sheffield.—June 17th. Installation of lighting at Parsons Cross School. Town Clerk, Town Hall (deposit £2).

South Africa.—CAPE TOWN.—June 14th. Electricity Supply Undertaking. Two three-phase current limiting reactors. (T. 22731/39.)*

June 21st. Electricity Department. Transformer units. (T. 23130/39.)*

June 28th. Hard-drawn copper-wire. (T. 23175/39.)*

June 29th. House service cut-outs. (T. 23176/1939.)*

June 29th. 20,000 pole fuses, complete with bolts, nuts and washers. (T. 23177/39.)*

June 30th. Overhead line material, including spindles, clamps, stay rods, line tap connectors and insulators. (T. 23179/39.)*

JOHANNESBURG.—June 14th. City Council. Electric lamps for twelve months. (T. 22978/1939.)*

June 26th. Railways and Harbours Administration. Telegraph material, including poles, bases, plates, stay wire, &c. (T. 23149/1939.)*

July 31st. Superheater elements. (T. 23147/1939.)*

NATAL.—June 21st. Provincial Tender Board. One electric lift at the maternity ward block, Grey's Hospital, Pietermaritzburg. (T. 22739/39.)*

Spenborough.—June 9th. Electricity Department. One 12-panel, 11,000-V switchboard. (May 26th.)

South Shields.—Education Committee. Electric lighting installation at the Wenlock Road Junior and Infants' school. G. R. Smith and Partners, architects, 3, Winchester Street.

Stoke-on-Trent.—June 14th. Electrical Engineer's Department. One 8-cwt. electric van. (May 26th.)

Stone.—June 28th. Electricity Department. Extra-high-voltage overhead line and underground cable. (See this issue.)

Sunderland. — Education Committee. Installation of electric lighting in the Havelock junior and infants' school. Plans by the education architect, 4, Tatham Street.

Swansea.—June 19th. Electricity Department. Oil circuit-breakers and oil-immersed isolators. (See this issue.)

Uruguay. — MONTEVIDEO. — July 19th. Electricity Works Administration. 380 lead clamping sleeves of various sizes, for wires and cables. (T. 22889/39.)*

July 20th. State Electricity Supply and Telephones Administration. 8,000 metres of underground armoured telephone cable. (T.Y. 22890/39.)*

Orders Placed

Barrow-in-Furness.—Electricity Committee. Accepted. Bus-bars and kiosks (£754).—Met.-Vick. Elecl. Co. Superheater tubes (£306).—Stirling Boiler Co.

Birkenhead. — Electricity Committee. Accepted. Two feeder units (£154 each) and one bus section switch (£196).—G.E.C. Electric tower wagon (£580).—Midland Vehicles.

Education Committee. Accepted. Renewal of electrical installation at Conway central school (£409).—J. Heaney & Co.

Blackpool.—Accepted. Electrical installations at hotels: Duke of York Hotel.—Nelson Bros. Fleece Hotel and Gynn Hotel.—P. J. Frampton. The Casino.—Drake & Gorham.

Cheltenham.—Electricity Committee. Accepted for twelve months. Cables.—Aberdare Cables; Hackbridge Cable Co.

Dundee.—Housing Committee. Accepted. Electric lighting installations in 280 houses (£2,380).—Stenson & Co.

Eastbourne. — Electricity Committee. Accepted. High-voltage circuit-breakers (£23,572) and protective relays (£1,558).—Ferguson, Pailin. Potential transformers (£229).—Hackbridge Electric Construction Co. Battery equipment (£271).—Britannia Batteries.

Hazel Grove.—Electricity Committee. Recommended. One 500-kVA (£258) and one 250-kVA transformer (£137).—Electric Construction Co.

Hull.—Telephones Committee. Accepted. Cable (£89).—Union Cable Co. Copper wire (£401).—B.I. Cables.

London.—L.C.C. — Accepted. Wiring and fittings for electric lighting, &c.: Dwellings on the Gascoyne estate, Hackney (£1,875) and dwellings in the Lant Street area, Southwark (£282).—Newman & Watson. Dwellings in the Dorset Road area, Lambeth (£3,236).—Holliday & Son (Electrical). Dwellings on the Ryehill estate, Camberwell (£1,084).—A. Meckhonik.

SOUTHWARK.—Housing Committee. Recommended. Electrical installation at Barons Place tenements (£1,007).—A. Meckhonik.

Manchester.—The Electricity Committee has placed the following on the list of contractors for the supply of cable for twelve months.—Scottish Cables; Connolly's (Blackley); Aberdare Cables; Lancashire Cables; Britannic Electric Cable & Construction Co.; Standard Telephones & Cables; W. T. Glover & Co; B.I. Cables; Wholesale Fittings Co.; L. Andrew & Co.; Hackbridge Cable Co.; Ward & Goldstone; Mersey Cable Works; City Incandescent Light Co.; Pirelli-General Cable Works.

Accepted. 660-V DC switchboards for trolley-bus sub-stations. — Bertram Thomas. 6,600-V switchgear at Green-

wood Street sub-station.—Ferguson, Pailin. Mercury-arc rectifier equipments.—Electric Construction Co.

Accepted for twelve months: Lamp shades.—Wholesale Fittings Co.; H. G. Richardson & Son; Hailwood & Ackroyd. Electric kettles. — Premier Electric Heaters. Electric motors.—British Thomson-Houston Co.; Laurence, Scott & Electromotors. House-service cut-outs.—Parmiter, Hope & Sugden; Siemens Electric Lamps & Supplies. Static transformers. —Ferranti.

Middlesex.—Education Committee. Accepted. Installation of electric lighting at West Drayton and Providence Road, Yiewsley, schools (£492).—Watson & May.

Oldbury.—Works Committee. Accepted. Lanterns for Wolverhampton Road (£2,041).—G.E.C.

Richmond (YORKSHIRE).—Town Council. Accepted. AC supply from the Pilmoor Hill station: Cables (£855).—Riley & Neate. Switchgear (£168).—Switchgear & Cowans.

Rugby.—Electricity Committee. Accepted. 4,450 yd. cable for the change-over of the low-voltage network (£1,604). —Henley's.

Sheffield.—Electricity Committee. Accepted. Electrode boiler (£609).—Reyrolle & Co.

Stoke-on-Trent.—Electricity Committee. Accepted. Street lighting.—B.T.H. Co.; G.E.C.; Met.-Vick. Electrical Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Cinema at Woodside, to seat 1,200 (£15,000); J. F. Donald (Aberdeen Cinemas, Ltd.), proprietors.

Addlestone (SURREY).—Cinema, Station Road; Ragal (Addlestone), 155, Colmore Row, Birmingham.

Ashby-de-la-Zouch.—Cinema at St. Helens Market Street, for A. Brown, 23, Temple Row, Birmingham; Harold S. Scott, architect, 115, Colmore Row, Birmingham.

Barnstaple.—Houses (262), Ashford; Woolaway & Sons, builders.

Batley.—Technical college, for West Riding E.C.; county architect, Wakefield.

Bedford.—Century cinema (£100,000), Dane John Street, for Bernstein Theatres, Ltd.; Lyons, Israel & Elsom, architects, 6, Bryanston Street, London, W.1.

Beyton.—Senior school (£14,237); West Suffolk Education Committee, Shire Hall, Bury St. Edmunds.

Birkenhead.—Houses (363), Woodchurch Road, for Boultons (Prenton), Ltd.; John Escolme. Houses (54), Bedford Avenue (£26,573); Peak Construction Co.

Birmingham. — Factory buildings, Carver Street; F. H. Thomason, architect, 174, Corporation Street. Enlargement of senior school, Beeches Road (£17,600); Education Committee.

Boston (LINCOLNSHIRE).—Hospital at Boston; W. M. Smith, county architect, County Hall.

Brigg.—Senior school (£28,412); Lindsey (Lincs) Education Committee, County Offices, Lincoln.

Caernarvonshire.—Junior and infants' school, Llanllechid, and senior school for 240 scholars at Botwnnog; county architect, W. L. Jones, County Offices, Shirehall Street, Caernarvon.

Chessington. — School, Moor Lane (£18,533); W. H. Gaze & Sons, 40, Conduit Street, London, W.1.

Consett (Co. DURHAM).—Houses (96) for U.D.C.; L. W. Evans, contractors, 18, Norfolk Street, Sunderland.

Darfield.—Houses (34), Barnsley Road, for U.D.C. (£12,883); Dyson, Cawthorne & Coles, architects, 25, Regent Street, Barnsley.

Dudley.—Market Hall fronting Hall Street and Birmingham Street (£163,000); A. T. & B. Butler, architects, Waterloo Street, Wolverhampton.

Eastbourne.—Senior school, Hampden Park (£21,850); Education Committee.

Filey.—Holiday camp, including dance and conference halls, &c. (£400,000); Butlins, Ltd.

Gateshead. — Factory, Team Valley estate, for Durham Steelwork, Ltd.; North-Eastern Trading Estates, Ltd., Team Valley estate. General hospital for the T.C. (£250,000); Gibson Brothers, builders, Hill Heads, Whitley Bay.

Gloucestershire. — Technical College, Cheltenham, for County E.C.; director of education, Gloucester.

Grangemouth.—Extensions to Scottish Dyes factory (£4,000); the manager.

Hawarden. — Houses (150), Saltney estate (£53,169); R.D.C. surveyor.

Hetton-le-Hole (Co. DURHAM).—Houses (218), U.D.C.; A. Fennell, architect, Bridge End Chambers, Chester-le-Street, Co. Durham. Houses (127) at Easington Lane, for the U.D.C.; G. Fordy & Son, builders, Boathouse Lane, Stockton.

Hitchin.—Extensions, North Herts and South Beds Hospital (£35,000).

Horley.—Central school; Surrey Education Committee, Kingston-on-Thames.

Hornchurch.—Library, Elm Park, for Essex E.C.; P. B. Tinker, 90, Eastern Road, Romford.

Keighley.—Baths (£28,000); borough engineer. Guard House school (£35,000), for E.C.; F. H. Crossley, architect, 51, North John Street, Liverpool.

Kidderminster.—Houses (28), Greatfield Hall estate; J. C. Richards. Houses (11), Cairndhu estate; Taylor & Taylor.

Lancashire.—Council school in Moss Lane, Litherland, and elementary school at Netherton; Stephen Wilkinson, County Offices, Preston.

Leicester. — Factory near Leicester generating station for Vitreous Concrete, Ltd.

Lichfield. — Houses (60), Ponesfield estate, for T.C.; Leslie Straw, city surveyor, the Guildhall.

Lincoln.—Houses (36), near Burton Road, for Bowins & Spafford, Halifax Chambers, High Street, Scunthorpe; John Sheffield Construction Co., contractors, Conesby House, Scunthorpe.

Liverpool. — Extensions, Mill Road Maternity Infirmary (£70,000).

London — (HAMMERSMITH). — Extensions, Queen Charlotte Hospital; Stanley Hall and Eastern & Robertson, 54, Bedford Square, London, W.C.1. (SOUTHWARK).—Baths, Borough High Street (£169,564); Haymills (Contractors), Hanger Green, London, W.5.

Macclesfield.—Houses (46), London Road housing estate, for T.C.; Edward Hamson, Town Hall. Maternity and child welfare centre on London Road estate, for T.C. (£2,830); Barker Bros., contractors, 20, Chester Road.

Maidenhead. — Municipal offices (£22,122), for T.C.; Creed & Co., builders.

Manchester.—Building (eight storeys), Mayes Street and Danzig Street, for Co-operative Wholesale Society. Two schools, Burnage and West Gorton; R.C. authorities. Flats (324), New Cross area (£189,526). Houses (322), Blackley (£135,607), and 70 flats, Ardwick (£52,798); city architect. Air Force buildings, Ringway airport; C. Miskin & Sons. Motor showrooms for David Rosenfield, Victoria Street, Manchester; K. C. Donaldson & Partners, architects, 17, St. Ann's Square.

Milford Haven.—Houses (120), Marble Hall estate; U.D.C. surveyor.

Morecambe.—Chemical factory, Middleton, for Air Ministry.

Newbury.—Cinema, Park Way; H. S. Scott, architect.

Newcastle-on-Tyne.—R.C. school for St. Dominic's; R. Burke, architect, Singleton House, Newcastle. School at Cowgate; Davison, Eason & Hartness, contractors, New Mills, Barrack Road, Newcastle. Houses at Deanham Gardens (28), at Silver Lonnen (24), and at Felling Street (8); F. M. Dryden, architect, Market Street, Newcastle. Houses (226) at Longbenton; city architect, 18, Cloth Market, Newcastle. Ice-rink, Portland Ice Rink, Ltd.; Marshall, Tweedy & Bourn, architects, Grainger House, Blackett Street, Newcastle. Block of business premises and offices for Montague Burton, Ltd., tailors; T. Clements & Sons, contractors, Selborne Gardens, Newcastle.

Newport (MON).—Senior school; Education Committee.

Northampton.—Houses (100), clearance areas; borough engineer.

Norwich.—Children's home, Marl Pit Lane estate Dereham Road for T.C.; City architect's office, City Hall.

Oldham.—Grammar school for girls (£47,279); Education Committee.

Oxford.—Baths, Hinksey (£69,140); city surveyor.

Rothbury (NORTHUMBERLAND). — Additions to Thomlinson's school for the governors (£7,000); T. Muckle & Sons, builders, Bridge Street.

Ryton-on-Tyne.—Cinema (700 seats); A. J. Lamb, architect, 7, Collingwood Street, Newcastle-on-Tyne.

Sale.—Bungalows (50) at Beech Farm, Dumber Lane, and Green Lane: E. Bleakley, borough surveyor, Town Hall.

Salford.—Baths, Great Clowes Street, Broughton (£68,500); W. Gornall & Sons. Senior school, Mandley Park, Higher Broughton (£29,935); R.C. authorities.

Sheffield.—Factory for Thomas Raynes, cutlers, 39, Eyre Lane; E. Chapman, architect, 2, Meeting House Lane. Warehouse, offices, and workshop for Edward Prior & Son, West End Works, Broom Street; H. J. Shepherd, architect, Town Hall Chambers. Sales shops and stores on Bocking Lane, Greenhill Main Road, for Sheffield and Eccleshall Co-operative Society, The Arcade, Eccleshall Road; J. W. Blackhurst, architect, Halifax Buildings, 57, Surrey Street. Sports stadium, Belle Vue (£60,000); city architect.

Shiney Row (DURHAM).—Senior school; Atlas Building & Construction Co., contractors, 232, Wilderspool Road, Warrington, Lancashire.

South Shields (Co. DURHAM).—Street lighting in the Holborn area; J. Reid, borough engineer, Town Hall.

Spenborough.—Senior school for the E.C.; Howarth & Walker, architects, Albion Street, Cleckheaton. Houses (210), Windy Bank Lane site, for U.D.C.; surveyor, Cleckheaton.

Stoneleigh.—Central school (£44,093); H. H. & F. Roll, 7, Ashley Road, Epsom.

Stroud. — Extensions to Infirmary (£50,000).

Sunderland.—Factory, D'Arcy Street, for Dawson & Usher; and hotel, High Street East, for L. Ormston; W. & T. R. Milburn, architects, 17, Fawcett Street. Gymnasium at the Lambton Street Boys' Fellowship Centre (£10,000); secretary. Flats (28), Dykelands Road; F. Buffham, builder, Beach Road, South Shields. School at Monkwearmouth; Randle & Co., contractors, Dunelm Street.

Sutton.—Houses (51), Sherborne Road; Wates, Ltd., London Road, Norbury.

Tynemouth.—Extensions, Moor Park Isolation Hospital.

Uttoxeter.—Houses (94) for R.D.C.; surveyor.

Walsall.—Senior school, Dartmouth Avenue; F. Bower Norris, architect, 134, Newport Road, Stafford.

West Hartlepool.—Hangar at civic airport (£10,000), for the Town Council: Head, Wrightson & Co., builders, Thornaby-on-Tees.

Weston-super-Mare. — Junior school (£17,566); Somerset Education Committee, County Hall, Taunton.

Whitley Bay (NORTHUMBERLAND).—R.C. school; R. Burke, architect, Singleton House, Newcastle-on-Tyne.

Willenhall.—Houses (154), Portobello estate (£52,450); U.D.C. surveyor.

Wilton.—Houses (54) for T.C.; G. L. Lush, Town Clerk, Municipal Offices, Fugglestone House.

Wolverhampton.—Hotel (£200,000), Victoria Square; Robert Cromie, architect, 6, Cavendish Square, London, W.1.

Wycombe.—Houses (52), Loudwater and Piddington (£21,140); R.D.C. surveyor.

York.—Senior school, Gale Lane, Acomb (£29,983); W. Birch & Sons. Pumping station, Barmby Avenue; C. J. Minter, city engineer, Guildhall. Senior girls' school, Water Lane; Education Committee.